MINAG

IICA

PROCEEDINGS

OF

"THE INSTITUTIONAL CONTEXT FOR ON-FARM ADAPTIVE RESEARCH"

ROUND-TABLE

THE MINISTRY OF AGRICULTURE
THE INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE

IICA OFFICE IN JAMAICA

WHAT IS IICA?

The Inter-American Institute for Cooperation on Agriculture (IICA) is the specialized agency for agriculture of the inter-American system. The Institute was founded on October 7, 1942 when the Council of Directors of the Pan American Union Approved the creation of the Inter-American Institute of Agricultural Sciences.

IICA was established as an institution for agricultural research and graduate training in tropical agriculture. In response to changing needs in the hemisphere, the Institute gradually evolved into an agency for technical cooperation and institutional strengthening in the field of agriculture. These changes were officially recognized through the ratification of a new Convention on December 8, 1980. The Institute's purposes under the new Convention are to encourage, facilitate and support cooperation among the 32 Member States, so as to better promote agricultural development and rural well-being.
With its broader and more flexible mandate and a new structure to facilitate direct participation by the Member States in activities of the Inter-American Board of Agriculture and the Executive Committee, the Institute now has a geographic reach that allows it to respond to needs for technical cooperation in all of its Member States.

The 1987-1993 Medium Term Plan, the policy document that sets IICA's priorities, stressed the reactivation of the agricultural sector as the key to economic growth. In support of this policy, the Institute is placing special emphasis on the support and promotion of actions to modernize agricultural technology and strengthen the processes of regional and subregional integration.

In order to attain these goals, the Institute is concentrating its actions on the following five programs:

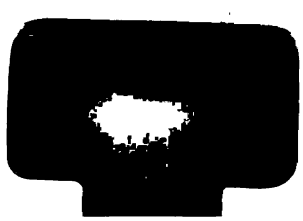
- Agricultural Policy Analysis and Planning
- Technology Generation and Transfer
- Organization and Management for Rural Development
- Marketing and Agroindustry
- Animal Health and Plant Protection

These fields of action reflect the needs and priorities established by the Member States and delimit the areas in which IICA concentrates its efforts and technical capacity. They are the focus of IICA's human and financial resource allocations and shape its relationship with other international organizations.

To further reach its objectives of encouraging, promoting and supporting the efforts of the Member States in the area of agricultural and rural development, the Institute renders technical services aimed at strengthening national institutions involved in this sector and serves as a multinational body for cooperation among member countries. IICA also provides direct advisory services and consultancies, implements projects, and acts as a forum and vehicle for the exchange of ideas, experiences and cooperation between the countries, organizations and other entitites active in the agricultural arena.
The contributions provided by the Member States and the ties IICA maintains with its twelve Permanent Observer Countries and numerous international organizations provide the Institute with channels to direct its human and financial resources in support of agricultural development throughout the Americas.

The Member States of IICA are: Antigua and Barbuda, Argentina, Barbados, Belize, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominica, the Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, the United States of America, Uruguay and Venezuela.

The Permanent Observer Countries of IICA are: Arab Republic of Egypt, Austria, Belgium, Federal Republic of Germany, France, Israel, Italy, Japan, Netherlands, Poland, Portugal, Republic of Korea and Spain.



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THE INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE

Prepared by:

Marlene Tomlinson

CONTENTS

1. INTRODUCTION

The round-table meeting on "The Institutional Context for On-Farm Adaptive Research," hosted by the Ministry of Agriculture and the Inter-American Institute for Cooperation on Agriculture, was held at the Terra Nova Hotel, Kingston, Jamaica on May 19, 1993.

Presented as background information prior to the round-table was a position paper prepared by IICA titled "THE INSTITUTIONAL CONTEXT FOR ON-FARM ADAPTIVE RESEARCH" (See Annex II). This paper outlined MINAG/IICA's views on hillside farming and on-farm adaptive research and highlighted the involvement of MINAG/IICA in hillside agriculture projects that span over a decade. These projects have evolved into a methodology whose features can be summarized as:

1) Short/medium-term production benefits balanced with a long-term orientation to protection of fragile hillsides;

2) Client participatory, focusing on farmers' needs and collaboration in on-farm research and resource management;

3) Responsive to the high level of diversity of hillside agriculture (i.e., mix of annual crops and permanent crops); and

4) Concerned with technology generation and transfer for improved agricultural production in both an environmental (watershed management) and socio-economic (rural incomes, employment) context.

The most critical component of this methodology is on-farm adaptive research. In the case of Jamaica, there is a large number of small farmers located on the hillsides and producing food crops whose productivity and incomes have not increased significantly in the last decade, nor has soil erosion been appreciably reduced.

Thus, while a general methodology has been conceived which can address small hillside farmer needs, it has not been effectively institutionalized within the national research and extension system so as to improve food and crop production while protecting the natural resource base. A "gap" therefore exists in the research system caused by the absence of an on-farm adaptive research unit.

Based on the foregoing, the OBJECTIVE of the round-table was to discuss issues concerning the institutionalization of an on-farm research capability drawing on the Hillside Agriculture Sub-Project's (HASP) multidisciplinary, integrated farming systems approach. In addition, it was envisioned that the following issues would be addressed by the meeting:

1) **How to create the institutional configuration (and collaboration) that will sustain what has been accomplished;**

2) **How to establish an on-farm adaptive research capability within the agricultural development structure; and**

3) **How to sustain/expand the activities and benefits of HASP.**

A list of participants present at the meeting is attached as Annex I as well as the programme itself.

Armando Reyes Pacheco
Representative

2. PRESENTATIONS

The opening ceremony was chaired by Dr. L. Van Crowder, Technology Generation and Transfer Specialist, IICA. Dr. Crowder welcomed the participants to the meeting and requested that they introduce themselves. The Permanent Secretary for the Ministry of Agriculture delivered the opening address. This address focused the relevance of research agencies to satisfactorily address the needs of the farm community in general, and the particular needs of the small farmer. The major text of this address appears in Annex III.

Dr. Renford Baker, Director of Research and Development, MINAG, presented for the information of the meeting the specific round-table objectives and outputs from the perspective of MINAG. The meeting was asked to note and acknowledge the representative from the Office of the Prime Minister (OPM). Special attention was directed to the efforts of the USAID's Hillside Agricultural Project (HAP) in Jamaica. In presenting the objectives and outputs, Dr. Baker made reference to a proposal presented to the Ministry of Agriculture at a workshop held May 25-26, 1989, on the **INSTITUTIONALIZATION OF FARMING SYSTEMS.** He noted that it was three years later and institutionalization still had not occured.

The chairman, Dr. Crowder, drew to the participants' attention that "farming systems institutionalization" was a slow process and urged them to address the obstacles to institutionalization at the meeting.

(i) ROUND TABLE OBJECTIVES

The overall objective of the round-table was to discuss issues concerning the institutionalization of an on-farm adaptive research capability drawing on the Hillside Agriculture Sub-Project's multi-disciplinary, integrated farming systems approach.

The participants' knowledge of research and extension, the role of small hillside farmers in domestic food (and export) crop production, and the importance of watershed protection for the entire agricultural sector contributed to a discussion of how best to institutionalize adaptive research for generating and disseminating improved hillside technologies.

The Hillside Agriculture Sub-Project is viewed as offering on-going activities and a competence that facilitates the institutionalization process. A conceptual framework and an operational methodology have been developed (i.e., integrated farming systems research and extension) from "the bottom up" through the HASP and previous hillside projects. The issue is how to create the institutional capacity to sustain what has been accomplished?

Thus, the objectives addressed were: 1) How to establish an on-farm adaptive research capability within the agricultureal development structure? and 2) How to sustain/expand the activities and benefits of HASP?

(ii) OUT-PUTS

At the conclusion of the round-table, it was expected that there would be suggestions for developing a strategy/model for the institutionalization of an on-farm adaptive research capability within the national development structure, recognizing the possible need for institutional strengthening as part of the process. It is reasonable to expect that the strategy/model will involve a multi-institutional approach.

The output from this round-table was not seen as an end in itself, but the beginning of a process of institutionalizing on-farm adaptive research. Thus, the strategy/model will need a plan of action that identifies the next step in the process.

(iii) OVERVIEW OF SMALL-FARMER HILLSIDE AGRICULTURE

Tabled before the Meeting was a paper entitled "Overview of Small-farmer Hillside Agriculture" which was presented by Dr. Tomas Mulleady, Rural Development Specialist, IICA. The paper detailed the characteristics of small hillside farmers as well as provided an overview of their behaviour and some of the constraints affecting their development and the impact on the environment. The paper concluded by pointing out that the costs to society in terms of the deterioration of natural resourses, damage to the environment and infrastructure, merit investing resources in the analysis of these and other options for the improvement of agriculture on the hillsides. (See Annex IV.)

(iv) OVERVIEW OF ON-FARM ADAPTIVE RESEARCH AND THE FARMING SYSTEMS APPROACH

A paper entitled "OVERVIEW OF ON-FARM ADAPTIVE RESEARCH AND THE FARMING SYSTEMS APPROACH" was presented by Dr. L. Van Crowder, Technology Generation & Transfer Specialist, IICA. The introduction to the paper referred to statements written by David Edwards thirty years ago which described Jamaican farmers' rejection of new technology and proposed that the solution was on-farm research, which is as appropriate today as it was then. Particular emphasis was placed on the need to combine research with what farmers are actually doing. The full text of this report is attached at Annex V.

The attention of the meeting was directed to the mechanisms for implementing FARMING SYSTEM RESEARCH/ EXTENSION by the chairman of the meeting. He urged the meeting to consider the following:

- **MECHANISMS FOR IMPLEMENTING ON-FARM ADAPTIVE RESEARCH (FSR/E)**
- **INSTITUTIONAL CONFIGURATION**
- **RESOURCES (HUMAN, FINANCIAL)**
- **POLICY**
- **CONSTRAINTS**

3. ROUND-TABLE SUMMARY OF PRESENTATIONS

The attention of the meeting was directed to the summary by the Representative from IICA, Dr. Armando Reyes Pacheco, of the round-table's presentations. The IICA Representative pointed out that there were three (3) main points to review, namely:

(a) Dr. Mulleady's presentation focused on small hillside farmers, their economic and social problems as well as the constraints affecting their development and the impact on the environment. His model projected the small hillside farmers "as rational and efficient users of resources given the constraints they face and the opportunites open to them".

While recognizing the complex nature of the system of small farming on the hillside, the Representative continued by stressing that it was absolutely essential for the problems to be solved now as the deterioration of natural resources and soil degradation will continue.

(b) The IICA Representative continued by conceptualizing a framework which focused on TECHNOLOGICAL KNOW HOW, HUMAN RESOURCES AND FINANCIAL RESOURCES by suggesting that Dr. Crowder's paper provided the framework for Institutional Analysis and Technological Know How.

(c) He continued by questioning whether the available status of financial resources in Jamaica could implement the mandates of Mr. Franklin and Dr. Baker. The Representative further suggested that the approach of TECHNOLOGICAL KNOW HOW, HUMAN RESOURCES AND FINANCIAL RESOURCES was a realistic guideline.

4. ROUND-TABLE DISCUSSION

The consultant Dr. Johnson opened the discussion by supporting the justification of the efficiency of small farmers as suggested by Dr. Mulleady's paper.

The Representative from the Prime Minister's Office, Dr. Arnaldo Ventura, suggested that the meeting should address this issue at the policy level. He further suggested that the meeting should examine the policy implications of the following:

* Whether there was a future for small farmers as a group;

* The change in numbers of small farmers;

* The benefits gained from small farming capabilities in the agricultural system.

The Permanent Secretary, Mr. Clarence Franklin, proposed that a definition of the term FARMING SYSTEM RESEARCH should be made. In addition, he highlighted the following points:

* Whether the group being targetted amounted to 60,000 or 90,000 farmers;

* The need to demonstrate to the farmer that the system will succeed, as we are unable to give farmers guarantees that they will benefit financially from new technology;

* The need to explore the reasons behind the farmer's lack of adoption of technology;

Dr. Crowder, IICA, noted that the overall goal of farming systems research was to develop small-farmer technology through on-farm trials that sought solutions to problems identified by the farmers themselves. He further noted that adoption of these technologies was enhanced because they fit the farming systems in which the farmers operated and responded to their evaluation criteria, not those of researchers.

The representative from JARP, Dr. L. McLaren, informed the meeting that it needed to:

* Focus attention on the "clientele";

* Recognize the constraints; and

* Consider the present economic climate.

The representative from CARDI, Dr. J. Reid, asked the meeting to note the following:

* Although adequate research had been generated, the relevance was lost as there existed a missing link between the farmer and the Extension worker;

* The policy direction in terms of research approach and design;

* The emerging difficulties in making change;

The Banana Board representative, Dr. J Dixon, suggested that more emphasis needed to be focused on the role of the sociologist, as this was seen as the missing link and a critical need existed in this area.

The RADA representative, Mr. H. Fraser, endorsed the views expressed by the Banana Board representative and questioned the level of efficiency of the hillside farmers.

In acknowledgement to the views expressed by the RADA representative, the IICA representative, Dr. Reyes, drew the meeting's attention to the fact that given the constraints and opportunities available to the hillside farmers, they have been able to maintain themselves in a"steady state of equilibruim".

The representative from UWI, Mr. D. Hutton, noted that there was a tendency among small farmers to declare that they do not have to be efficient as they have other sources of income such as relatives abroad who will support them.

Dr. Mulleady, IICA, for the benefit of the meeting, noted the difference between technological efficiency and economic efficiency.

In response to the above query, Dr. Crowder informed the meeting that perhaps the emphasis should be placed on the SYSTEM rather than the FARMER. He further posed the following questions:

* Is the research system doing a good job for the small farmer?
* Can the system be improved?

The representative from CARDI, Dr. Janice Reid, drew the meeting's attention to the topic of how research priorities are established. She stated that the usual approach is to assume "what is good for the farmer" rather than going directly to the farmer to find out specifically "what his needs are" and whether he is satisfied with his level of production.

The consultant Dr. Johnson endorsed the views expressed by the CARDI representative and added that the need exists for more information from the farmers themselves.

The representative from RADA informed the meeting that a participatory and "bottom-up" approach is essential in understanding the needs of the farmer.

The representative from the MINAG, Dr. Baker, while endorsing the views expressed by his colleagues, was of the opinion that the input of the sociologist was critical in understanding the farmer and his "family situation".

The representative from RADA, Mr. Leonard Henry, reiterated that the meeting needed to address the issue of a definition of the small farmer.

The Permanent Secretary, informed the meeting and questioned whether it was factual or a misnomer in stating that the farmers are not adopting new technology? He further questioned whether the meeting was fully aware of the facts pertaining to the availability or unavailability of technology for the farmers?

The representative from CARDI also questioned whether the appropriate technology was being transfered to the farmer?

The consultant, Mr. Van Whervin, informed the meeting that the small farmer on the hillside had difficulty understanding the financial benefits he would gain from the use of new technology.

The representative from the Banana Board, Dr. Jean Dixon, endorsed the views expressed by the consultant and noted that the technology was not appropriately packaged for the individual farmer.

The representative from the Coconut Board, Mr. Basil Bean, noted that there was the tendency to formulate solutions to the problems before defining them.

The representative from the Office of the Prime Minister again questioned whether the present population of small farmers is shrinking and whether they were phasing themselves out? He continued by informing the meeting that from an environmental perspective, the small farmer will become a major problem to "all of us" as his practices are not "environmentally friendly".

In response to the views expressed by the representative from the Office of the Prime Minister the IICA representative, Armando Reyes Pacheco informed the meeting that if the present economic climate remains, the small farmer will be "wiped out" and consequently, will move away from the hillside to the urban centres. He continued by posing the question to the meeting as to whether the present state of environmental degradation is a result of small farmers? Are their systems really that unfriendly to the environment?

The representative from the Office of the Prime Minister informed the meeting that it was necessary first to prioritize, then focus on the environmental aspect of the problem.

In the ensuing discussion, the representative from JARP, Dr. L. McLaren, endorsed the views expressed by his colleagues and drew the attention of the meeting to the following:

1) while focusing on the farmer in relation to environmental degradation reduction, it will be necessary at the same time to focus also on the farmers with potential for high level production;

2) the need to concentrate more attention on the available technological resources to reduce the level of environmental degradation.

The meeting was concerned with the technology that has been passed on to farmers and the low level of sustainability of these methods.

The representative from the Office the Prime Minister questioned whether there were any existing environmentally friendly systems in place for farmers to utilize. In response to above-mentioned query, the Permanent Secretary for MINAG informed the meeting that the small farmer had to work the land in order to sustain his family. He also made reference to the Training, Visit and Monitor Extension system which he said failed because it did not successfully demonstrate to the farmer the RISK FACTORS.

The representative from RADA, Mr. Hopeton Fraser, informed the meeting that the RADA approach focuses on a "bottom up" planning approach, where extension officers network with "area development committees" consisting of teachers, farmers and community leaders.

The Permanent Secretary drew the attention of the meeting to the following:

1) that the reality for the farmers is to feed their families while their tree crops are growing;

2) in order to assist the farmer to sustain his family, a special fund should be created to enable the farmer to earn while his crop is in production and to assist in times of emergency.

The attention of the meeting was drawn to the need to decide on "a plan of action" for implementation after the meeting. Bearing this in mind, the Permanent Secretary for the MINAG, suggested that the meeting should define FARMING SYSTEM RESEARCH/EXTENSION. Dr. Crowder noted that it had been defined in his presentation.

The IICA representative, Dr. Mulleady, informed the meeting that in his view a significant number of problems needed to be defined, not just farming systems R & E. He continued by stating that a steering committee should be appointed to draft the definitions and a retreat should be planned to develop a proposal\plan of action for funding of an institutional effort.

The meeting endorsed the above suggestion and the following individuals were proposed as committee members:

Janice Reid (chair)	R. Baker
Jean Dixon	A. Ventura
H. Fraser	J. Suah
L.Van Crowder	L. Henry
D. Hutton	

The meeting further proposed that the report of the round-table be used by steering committee members as background documentation for a Funding Proposal and Retreat.

The general issues to be addressed by the steering committee are to be:

1) The technical and human resources available and required to institutionalize OFAR in Jamaica.

2) The institutional framework and organizational structure for OFAR.

3) The existing and required policy for OFAR in the context of Jamaica's agricultural development plans.

4) The intended clients of OFAR.

5) Mechanisms for implementing OFAR and possible barriers; The feasibility of a "pilot project" approach.

ANNEX I

PROGRAMME AND LIST OF PARTICIPANTS

ROUND-TABLE PROGRAMME
Ministry of Agriculture/Inter-American Institute for Cooperation on Agriculture

Terra Nova Hotel 9:00 - 2:00
May 19, 1993,

9:00 - 9:15	Opening Address by Mr. Clarence Franklin, Permanent Secretary, MINAG
9:15 - 9:30	Round-Table objectives and Outputs Dr. Renford Baker, Director, R & D, MINAG
9:30 - 9:45	Overview of Small-farmer Hillside Agriculture, Dr. Tomas Mulleady, IICA
9:45 - 10:00	Overview of Adaptive Research and the Farming Systems Approach Dr. L. Van Crowder, IICA
10:00 - 10:30	COFFEE BREAK
10:30 - 2:00	Round-Table Discussion Moderated by Dr. Renford Baker
	LUNCH

PARTICIPANTS

NAME	POSITION	ORGANIZATION
Janice Reid	Representative	CARDI
Barbara Graham	Officer-in-Charge	FAO
Rainer J. Schierhorst	Agro-Economist	EEC
Clarence Franklin	Perm. Secretary	MINAG
Renford Baker	Director, R & D	MINAG
Hopeton Fraser	Actg. Exec. Director	RADA
Leonard Henry	Dir. Technology & Tech. Info.	RADA
Lyndon McLaren	Asst. Director	JARP
Basil Bean	Director Research	CO.IND.BD.
Jean Dixon	Representative	Banana Board
Christopher Brown	Dir. Nat.Res/Agric.	USAID
Mark Nolan	Project Officer	USAID
Joseph R.R. Suah	Project Manager	HAP/USAID
Walter Van Whervin	Consultant	
Irving E. Johnson	Consultant	
Claudette Bernard	Agronomist	SNAP
Dave Hutton	Fac. of Agric.	UWI, MONA
Arnoldo Ventura	Special Advisor	Office of the Prime Minister
Reed Hertford	Dep. Dir. General	IICA, San Jose
L. Van Crowder	Tech. Generation & Transfer Specialist	IICA, Jamaica
Armando Reyes	Representative	IICA, Jamaica
Tomas Mulleady	Rural Dev. Spec.	IICA, Jamaica
Charles Reid	Agronomist	HASP/MINAG
Hyacinth Chin Sue	Agronomist	IICA

ANNEX II

INTRODUCTION TO THE ROUND-TABLE

ROUND-TABLE DISCUSSION
ON

"THE INSTITUTIONAL CONTEXT FOR ON-FARM ADAPTIVE RESEARCH"

Hosted by the Ministry of Agriculture and
The Inter-American Institute for Cooperation on Agriculture

INTRODUCTION

IICA, in collaboration with MINAG, has conducted hillside agriculture projects (e.g., Allsides, Cropping Systems, HASP) that span over a decade of adaptive research. These projects have resulted in a generalizable methodology whose features can be summarized as 1) short/medium-term production benefits balanced with a long-term orientation to protecting fragile hillsides; 2) participatory, focusing on farmers' needs and collaboration in on-farm research and resource management; 3) responsive to the high level of diversity of hillside agriculture (i.e., mix of annual crops and permanent crops); and 4) concerned with technology generation and transfer for improved agricultural production in both an environmental (watershed management) and socio-economic (rural incomes, employment, etc.) context.

IICA has recently completed a synthesis of its involvement with adaptive hillside research which describes the methodology used as well as its potential for agricultural development in the Caribbean. This methodology has developed from the "bottom-up" in the sense that the concepts and activities that characterize it have been generated from field-level research and dissemination efforts. There is now a need to further develop the institutional setting for this methodology.

The most critical component of this methodology is on-farm adaptive research. It is through this component that appropriate technology is generated. And as experience worldwide has shown (e.g., ISNAR studies), this approach is especially important for developing technology for small, limited-resource farmers. In the case of Jamaica, there are a large number of small farmers located on the hillsides and producing food crops whose productivity and incomes have not increased significantly in the last decade, nor has soil erosion been appreciably reduced. This is due, in large part, because of the lack of an on-farm adaptive research program that is part of a hillside agriculture development effort.

Thus, while a general methodology has been developed which can address small, hillside farmer needs, it has not been effectively institutionalized within the national research and extension system so as to achieve improved food (and export) crop production while protecting the natural resource base. There is a "gap" in the research system caused by the absence of an on-farm adaptive research unit. A report to USAID in 1983 ("A Strategy for

Jamaican Hillside Agricultural Development") noted that the "current structure and perspective of research make it difficult...to focus on addressing the problems of small hillside farmers...There is minimal interaction between farmers, extension agents, and researchers, and consequently low probability that the conditions under which experiments are mounted are similar to those farmers face." Ten years later, we have to ask if the situation has changed and if not, what can be done institutionally to fill the gap?

SMALL-FARMER HILLSIDE AGRICULTURE IN JAMAICA

Since 1983, Jamaica has been in the process of economic structural adjustment. The move to a market driven economy has had a negative impact on income distribution and the rural poor, including small farmers. The reformed incentive structure contains a strong export bias and conversely a bias against support to domestic production; small farmers, as opposed to large farmers, are included in this latter category. Bullock, in a recent report prepared for IICA, states that "Real incomes in the small farm sector...tended to fall as those in large scale agriculture tended to rise... The combined results of these policies has been an increase in the number of persons living in poverty" (1993:55;56).

In terms of land use, three principle types of agricultural usage can be identified:

1) Plantation crops grown mostly for export primarily on the coastal plains; 42.7% of total acreage or 30.8% of total farms.

2) Mixed farming of food crops mainly for domestic consumption, mostly on the central highlands; 29.0% of the total acreage or 55.7% of the total farms.

3) Pastures for beef and dairy cattle, mostly in the north central and western regions; 23.1% of total acreage or 5.8% of total farms.
(Strachan, 1993).

While about 75% of Jamaica's farms are under 25 acres, they account for only 15% of the total acreage in farms. Of those farmers who produce primarily domestic food crops, 74.2% farm 25 or less acres; 38.3% have under 5 acres. Many occupy the interior marginal hillside lands with slopes greater than 10 degress and composed of readily eroded limestone-based soils (50% of the land area of Jamaica has slopes 20 degrees and steeper). Although these farmers produce mainly for the domestic market, they play an increasingly important role in non-traditional export crop production.

The trends in domestic food production between 1981 and 1991 reflect overall stagnation. While there have been large fluctuations over the period, domestic production in 1991 is only slightly higher than in 1981.

The Jamaica National Report on the Environment and Development (1992) contends that the main environmental impacts from agriculture include soil erosion and reduced stream flow -- both due to poor land use and soil conservation strategies on hillsides. One estimate is that deforestation in Jamaica is between 3 and 3.3% per year (USAID, 1991).

Forest resources are often depleted to facilitate cultivation of annual food crops, exacerbating the loss of soil and disturbing the ecological balance of the watershed areas. Productivity of hillsides is reduced through erosion, which accelerates the loss of water from cropping areas and causes siltation and flooding. This suggests that the productivity of producers on hillside areas will decline over time with serious implications for not only domestic food production, but eventually the entire agricultural sector (Strachan, 1993).

In 1990, the Jamaican population was estimated to be 48% rural (approximately 1 million persons). According to a 1992 UNDP report, approximately 80% of the rural population live below the poverty line. Poverty is highly skewed: of the poorest 20% of the population (poorest quintile), 82% live in rural areas. Furthermore, persons in the poorest quintile are more likely to be engaged as self-employed agricultural workers (Anderson, 1990; Bullock, 1993). Many of these self-employed agricultural workers farm the hillsides of Jamaica. As a USAID document states, "Economic conditions will continue to force those people [below the poverty line] further into the hills, to farm more marginal lands" (1991:71).

Based on food consumption data reported in the 1989 Survey of Living Conditions (SLC), the poor are able to purchase only about two-thirds of their recommended dietary allowances. Anderson (1990) reports that while self-provisioning is likely higher in rural than urban areas, rural poor households experience a food gap of 35% compared to a food gap of 22% for Kingston households.

Jamaica, like other Caribbean countries, is dependent on imports for much of its food consumption. For the 1986-88 period, the food import dependency ratio was 66.3%; 1989 saw unusually high imports due to hurricane Gilbert. With the stagnation of domestic food production referred to above and the increase in population, there has been a greater reliance on food imports. As Bullock (1993:22) concludes, "There is thus the need for more incentives on the part of the government for farmers, especially small farmers producing for domestic consumption."

BACKGROUND TO HASP

The Hillside Agriculture Sub-Project (HASP) is funded by USAID through the Hillside Agriculture Project (HAP) and is implemented by MINAG R&D and IICA. Its broad objective is to develop tree-based production systems which contribute to increased incomes for small

hillside farmers while protecting watershed resources. It began in 1989 and is in its final year; its area of operation is northeastern St. Catherine.

The HASP project approach can be described as an "Integrated Farming Systems Research and Extension" methodology. The HASP, working through a multi-disciplinary team, includes on-farm adaptive research for tree crops and companion/inter-crops; extension of tree-based and resource conservation technologies; farmer organization and participation through Farmer Action Committee Teams (FACTS); an economic component that includes cost-benefit evaluation of on-farm trials; a plant protection component; a Market Fair; and a pilot input supply (farm store) and credit program.

The on-farm adaptive research includes establishment trials with ackee, coffee, mango and coconuts and rehabilitation trials with cacao, as well as intercropping trials (vegetables and plantains).

ROUND-TABLE OBJECTIVE

The objective of the round-table is to discuss issues concerning the institutionalization of an on-farm adaptive research capability drawing on the HASP's multi-disciplinary, integrated farming systems approach. The participants' knowledge of research and extension, the role of small hillside farmers in domestic food (and export) crop production, and the importance of watershed protection for the entire agricultural sector will contribute to a discussion of how best to institutionalize an adaptive research expertise for generating and disseminating improved hillside technologies.

The HASP offers on-going activities and a competence that could facilitate the institutionalization process. It is important to recognize that a conceptual framework and an operational methodology have been developed (i.e., integrated farming systems research and extension) from the bottom up through the HASP and prievious hillside projects. The issue now is how to create the institutional configuration (and collaboration) that will sustain what has been accomplished?

The two related issues to be addressed, therefore, are: 1) How to establish an on-farm adaptive research capability within the agricultural development structure? and 2) How to sustain/expand the activities and benefits of HASP?

OUT-PUTS

At the conclusion of the round-table, it is expected that there will be suggestions for developing a strategy/model for the institutionalization of an on-farm adaptive research capability within the national development structure, recognizing the possible need for institutional strengthening as part of the process. It is reasonable to expect that the strategy/model will involve a multi-institutional approach.

The output from this round-table is not an end in itself, but the beginning of a process of institutionalizing on-farm adaptive research. Thus, the strategy/model that is produced will need a plan of action that identifies the next step in the process.

Participants:

Armando Reyes, IICA/Jamaica
Tomas Mulleady, IICA/Jamaica
L. Van Crowder, IICA/Jamaica
Charles Reid, HASP/Jamaica

Janice Reid, CARDI
Barbara Graham, FAO
Jacques Cook, IDB
Dennis Martin Benn, UNDP
Rainer Schierhorst, EEC

Clarence Franklin, MINAG
Renford Baker, MINAG
Marie Strachan, MINAG
John Maxwell, Bodles Agri. Res. Stn.

Garnet Brown, RADA
Hopeton Fraser, RADA
Leonard Henry, RADA
Derrick Dyer, Chairman, RADA

George Wilson, JARP
Lyndon McLaren, JARP

Basil Bean, Coconut Industry Bd.
Jean Dixon, Banana Board

Robert Queener, USAID
Christopher Brown, USAID
Mark Nolan, HAP/USAID
Joe Suah, HAP/USAID

Walter Van Whervin, Consultant
Irving E. Johnson, Consultant

Ross Noble, CIDA
Peter Houliston, CIDA
Ed Spratt, SNAP

Dave Hutton, UWI
Arnaldo Ventura, SRC

ANNEX III

COMMENTS BY MR. CLARENCE FRANKLIN PERMANENT SECRETARY MINISTRY OF AGRICULTURE ON FARM ADAPTIVE RESEARCH

COMMENTS

ON FARM ADAPTIVE RESEARCH: An important strategy for increasing small farmer productivity.

In the 1960s, a common misconception in various developing countries and technical assistance agencies was that agricultural production technology generated in temperate, industrialized countries could be transferred to increase productivity in mostly tropical, developing countries. In later years, it was realized that agricultural technology needs to be generated in and/or adapted to the unique ecological and socioeconomic conditions in developing countries. Emphasis shifted from direct transfer of technology to strengthening research organizations in the development of agricultural technology "in situ."

Furthermore, this lesson was extrapolated to include recognition of the need to establish on-farm, adaptive research units within research organizations that could help fit technology to farmers' conditions. Just as the socioeconomic and ecological conditions prevailing in developed countries differ from those of developing countries, so do the conditions of farmers, and particularly small farmers, differ from those of experiment stations.

The fact that holdings are smaller and that small farmers have fewer resources to control their production conditions affects the suitability of research station results. Large farmer, with irrigated, mechanized farms, have more in common with experiment station research than small farmers. This does not diminish the importance of station research for the improvement of national agriculture; it does mean that a research strategy has to address the technology development needs of small farmers, who in our case, are responsible for our domestic food supply.

This requires an institutional capability to take station research results to small farmers' fields to evaluate their performance under what are usually marginal production conditions. More attention to the needs of small farmers and to marginal hillside areas implies a need to decentralize the research effort. And while this is an important research strategy, it must be balanced with on-station research.

Therefore, a balance needs to be struck between the greater relevance and specificity achieved by decentralization and the loss in efficiency that can occur from excessive fragmentation of the research effort. It is possible to decentralize the research effort to a certain degree without excessive dispersion of staff and facilities. This can be facilitated if much of technology evaluation in its final stages is done on farmers' fields with their collaboration. To the extent that much of this work can be done by regional adaptive research teams, working with a range of private and public organizations, the more specialized scientific staff can be located at key regional experiment stations.

With the Structural Adjustment this country is under going, it is becoming clearer that the role of the Ministry of Agriculture is changing with its limited resource base. Small, low-resource farmers operating on fragile lands on hillsides who are producing food for domestic consumption, and at the same time becoming more and more impoverished as a result of structural adjustment, have to be the responsibility of the Ministry of Agriculture. It is a known fact that those countries which have developed, are either self sufficient or at least partially in their domestic food supply, and they achieved this by investing in research to develop technology appropriate to their farmers producing the domestic food.

In the allocation of resources, we are aware of the fact that on-farm research, while potentially cost effective, can be more expensive than station research. Furthermore, developing technology that is productive and also sustainable increases the costs. But they are worth the investment -- an investment that must be made if the potential of modern agricultural research is to enhance the well-being of current and future generations of farmers.

ANNEX IV

OVERVIEW OF SMALL-FARMER HILLSIDE AGRICULTURE
BY TOMAS MULLEADY, IICA

Overview of Small-Farmer Hillside Agriculture

By Tomas Mulleady

Prepared for the Round Table "Farming System Research", May 19, 1993

Background

Jamaica has an area of 1.09 million hectares (2.7 million acres) of which only 45% (1.2 million acres) are suitable for agriculture. About 60 percent of Jamaica is hilly with elevations ranging between 150 and 1,000 meters (500 and 3000 feet).

For historical reasons the hillsides are the domain of the small farmers who occupied the land during the first half of the 19th century. Land settlements implemented during this century were only partially successful. Many farmers never received land restricting access to credit and limiting farm investment possibilities. Many of these farmers ended up in semi-subsistence farming.

There are approximately 167,000 farms in Jamaica. Seventy-five percent are under 10 hectares (25 acres) and 38% are under 2 hectares (5 acres). Approximately 18% of all farmers are women. About 90% of farms operated by women are in the less than 5 acres group.

Half of Jamaica's 2.5 million people live in the rural areas and agriculture is the largest single source of employment. Thirty percent of the labour force works in agriculture.

The mass of the rural population engaged in agriculture depend on the income generated by these small farms and nearly 50 percent of the rural population is dependent on the performance of agriculture.

There is a large number of landless workers in rural communities and a few thousand hired seasonal workers on large sugar estates in the coastal lowlands. Underemployment and seasonal unemployment in the rural areas is high, approaching 50% among the young and women. Over the last twenty-five years, migration from rural areas to rural towns has resulted in the transfer of unemployment and poverty to the rural towns where economic activity is limited.

A series of programs to assist the rural population has been developed since the early 1940's. One objective was to put land in the hands of the rural population and to modernize the agricultural sector. Government and private lands were made available to farmers under various land lease arrangements. The 1980's saw a shift in agricultural and rural development policy. Emphasis was placed on attracting large private investments to government lands, mainly for technology intensive vegetables production for the export market. The "mother-farm" concept was promoted expecting to have a demonstration effect on small farmers and at the same time serve as a marketing channel for their production.

All these efforts contributed to the development of the rural areas and improved the well-being of the rural population, but there is still a long way to go. According to a 1993 IICA report, approximately 57% of the rural population lives below the poverty line. Most of the rural poor are found among landless workers and small hillside farmers with farms between 1 and 5 acres.

The structural adjustment of the economy initiated in the 1980's

includes adjustments in fiscal and monetary policies, trade liberalization and reduction in government intervention. These adjustments result in a new set of price incentives requiring adjustments in resource allocations and production. The impact of these changes on small farmers and how rapidly they adjust to the new incentives will depend on the existing information about new production alternatives and technology.

Small Farmers Characteristics

Small hillside farmers are characterized by the use of low levels of technology and inputs. Also, labour productivity is low. Land preparation and cultivation is done mostly with simple hand tools. Forking an acre of land may take 20-25 person-day, depending on the clay content of the soil.

In addition there are two distinct rainy seasons in most of the island. Proper soil moisture conditions for land preparation and timely planting annual crops is limited.

Most of the hillside are highly susceptible to soil erosion and many of these farms are in degraded soils. The hillsides of Jamaica are being over-cultivated from the standpoint of soil conservation and watershed protection. Land misuse has contributed to the problems of soil erosion and floods in various parts of the country.

Farm size and the needs of food and cash to meet household and farm expenses, forces the small farmer to plant the more profitable annual crops (roots and vegetables) without the necessary soil conservation measures. This aggravates the already

serious problem of soil erosion, limits the income generating capacity of the soil and increases unitary cost of production. In the long run, this will force the small farmer out of the market, unless new technology is developed to cope with these problems and allow farmers to maintain a competitive position. All these factors plus the land tenure conditions contribute to the low productivity and income levels of the small farmer. Low farm income limits farmers' possibilities of saving and investing in the farm and their constrained financial situation makes borrowing money very risky.

A Representative Farm

The farm is part of a complex system that includes, services, markets, political organizations and nature. The farmer interacts directly or indirectly with the other sectors through markets for inputs and products. Farm activities also affect their physical environment through soil depletion and water pollution. It is fundamental to understand how these factors influence farmers' decision-making and economic performance. It is not uncommon to hear that small farmers are tradition bound, that cultural and institutional restraints severely limit their responsiveness to market incentives. T. Schultz [1964] has demonstrated that traditional patterns of production are maintained because they represent a rational equilibrium under existing conditions. According to Schultz, that equilibrium represents a state in which given the technology available to the farmers, the rates of return to traditional inputs are so low

that little or not net investment takes place.

Schultz shows that, in general, farmers are rational in their decision-making process and efficient in the allocation of their resources.

Under such conditions he argues small changes in either the relative prices of inputs or in the quantities of inputs are unlikely to bring about any long run departure from this equilibrium.

It is on the basis of these results that the behavior of small farmers in Jamaica can be represented by a model as an economic individual whose choice among alternatives are made in an attempt to maximize his/her goals. With the purpose of exploring farmers' efficiency to allocate farm resources a multi-period four year farm model was developed. The model is used to simulate the path to follow to move a small farmer operation from its present situation to another with higher returns while preserving the environment.

The model is a simplified representation of a farm for the Districts of Golden Grove, Troja and Riversdale in the Rio Cobre watershed in Saint Catherine. The model represents a 4 acres farm with 25% of the area with soils and slopes suitable for citrus, sugar cane and annual crops and the other 75% suitable for tree crops, bananas and plantains. The model represents the complex manner in which prices, production alternatives, technology, yields and household consumption needs and decisions affect the allocation of resources and production activities.

Results

The results of the analysis show that small hillside farmers in the region allocate resources efficiently given the constraints they face and the opportunities open to them. The four year model optimum crop mix combination that maximizes income subject to farm resources constraints reflects what farmers are actually doing. The optimum crop mix includes 50% of the land (2 acres) with a combination of cocoa and coffee inter-planted with banana and plantain, 25% with vegetables and root crops and 25% unused land.

The model shows that given the actual technology and crop mix, the farm operation generates enough cash to satisfy basic household and farm operational needs without external financing. Through time farmers have adopted a crop mix that minimizes the need and the risk of borrowing money. Working capital is not a limiting factor in the implementation of the farm plan. This may help to explain the low demand for credit by small farmers. Labour supply is a limiting factor during land preparation to plant annual crops in April and during the period August-November. There is a surplus of labour in the other periods. The analysis shows that it is not economically feasible to increase the area with permanent tree crops alternatives presented in the model (coffee and cocoa). Farmers' income is higher if they continue with the same crop mix and level of activities.

Changes in the actual crop mix will require the re-allocation of working capital and labour to the establishment and

rehabilitation of permanent tree crops, thus reducing the area planted with annual crops and therefore farm income. Even if outside financing is available during the first two years it is not economically feasible for the small hillside farmer to increase the area with permanent tree crops. The use of the farmer's labour to maintain the additional acreage with tree crops in year three and four results in a reduction of income to the farmer.

Given that labour is the most limiting factor farmers cannot afford to behave differently. The labour constraint during the August-November period was released by introducing labour hiring activities in the model. As expected, the additional labour was allocated to the production of vegetables.

It is interesting to note that at the prevailing price relationship and land productivity, the farm model shows that the demand for additional labour is very low. This needs further analysis, but suggests a low demand for labour given the actual production alternatives available to the farmer. This may help to understand why farmers complain about the high cost of labour.

Conclusions

The model provides a basis for understanding small hillside farmers behavior and some of the constraints affecting their development and impact on the environment. The main conclusion of this preliminary analysis shows that small hillside farmers are rational and allocate resources efficiently. The results of the analysis seem to verify once more what Schultz concluded:

traditional patterns are maintained because they represent a rational equilibrium. That given the available technology and production alternatives open to them, there are little incentives to invest. That means that unless there is a flow of new highly profitable environmental safe technologies and crop combinations small farmers will continue to do what they are actually doing with the known effects on the environment, their low level of income and the impact on the development of the rural communities.

In the medium term, the problem needs to be addressed by exploring the feasibility of expanding other high-value tree crops; establishment and rehabilitation of tree crops associated with high-value annual crops; and by increasing the productivity of annual crops.

A strong research program testing sustainable, and economically feasible production alternatives to address the limiting factors small farmers face in the hillsides is essential. Also, there is a need to understand the inter-relationship between household and farm operations to understand what kind of incentives are needed to manage the natural environment in a more sustainable manner. The approach should take into consideration the whole farm system given the complexity of the factors affecting farmers decision-making and economic performance.

The costs to society in terms of the deterioration of natural resources, damage to the environment and infrastructure, merits investing resources in the analysis of these and other options for the improvement of agriculture on the hillsides.

It is hoped that this presentation stirs some thoughts on these problems and promotes some discussion for the benefit of small farmers and Jamaica society in general.

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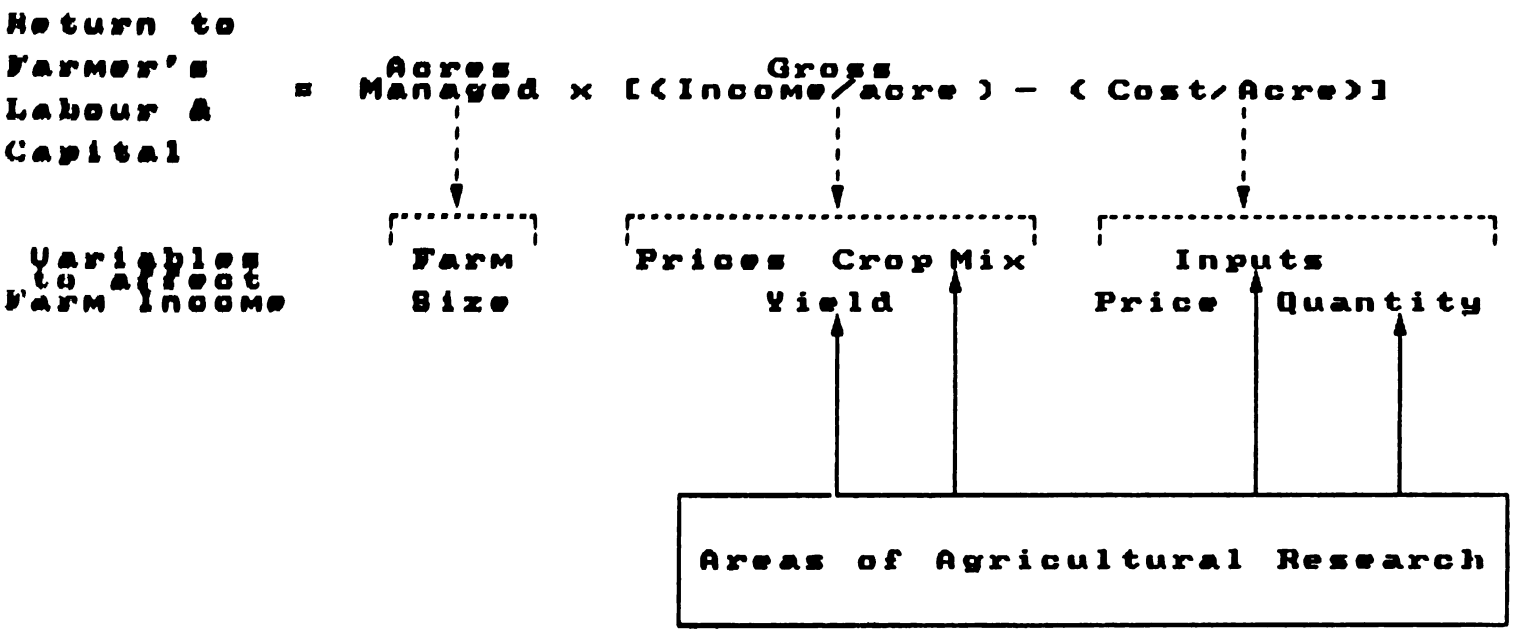
FARM INCOME COMPONENTS



ANNEX V

OVERVIEW OF ON-FARM ADAPTIVE RESEARCH AND THE FARMING SYSTEMS APPROACH

BY L. VAN CROWDER, IICA

OVERVIEW OF ON-FARM ADAPTIVE RESEARCH AND THE FARMING SYSTEMS APPROACH

Prepared by:

L. Van Crowder
Technology Generation &
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May, 19, 1993
Kingston, Jamaica

Introduction

> "Many a new practice was rejected by the farmers on the grounds that they did not know if they would be better off by adopting it. A farmer making this point about a new way of planting sweet potato said, 'Me have to follow what me sure of'. This statement reflected an outlook common to all farmers."
>
> "The only practical solution is for the individual farmer to be guided by results of investigations carried out under a set of ecological conditions roughly comparable to those of his own farm. Naturally, the data should relate to 'farm' rather than 'experiment station' type of management because the latter is likely to differ appreciably from the former and so would give information which would be misleading as a guide to farmers" (Edwards, 1961).

The above statements, written by David Edwards thirty years ago, vividly describe Jamaican farmers' rejection of new technology. The solution proposed by Edwards was on-farm research. It is as appropriate today as it was then.

Often, we have problems in need of solutions; sometimes, solutions in search of problems. However, over a number of years of trial and error, a solution to a problem may develop which gains wide acceptance. When this happens, there may be a "paradigm shift" -- people begin to view the problem differently, the solution becomes an accepted approach, and eventually it may be institutionalized.

This appears to be the case with on-farm, adaptive research with a farming systems approach. It is now widely accepted in the

developing world that farming systems research (FSR) is "needed because of the inability of the traditional or classical agricultural research approach to solve the problems of the small farmer outside the most favourable natural environments" (Shand, 1985). The challenge remaining in many countries, however, is that of institutionalizing an adaptive research/FSR effort within the national research program.

The Problem: Off-the-Shelf Technology

There is a common belief that there is plenty of agricultural production technology already "on the shelf" and that what is needed mostly is more effective extension to disseminate it. While in some cases this may be true, in many cases farmers do not adopt the technology that is taken off the shelf and passed along because it is not suitable for their conditions.

Agricultural research relies on science. Although closely linked, there is an important distinction between agricultural science and technology development. Farmers use technology not science, even though the technology is science-based. To be useful to farmers, agricultural technology must fit in their production systems; thus, it must be tested, adapted and integrated in a range of production systems. The wider the range of production environments it can serve, the more valuable it is.

An agricultural experiment station is not a production system. It is clear that adaptation of technology, which is a necessary pre-requisite for adoption by farmers, cannot be accomplished entirely on experiment station trials run by researchers and without farmer participation. All too often "adaptation" stops at the station experimental plot, resulting in little likelihood of successful technology transfer. Transfer from experimental plots is difficult not only because it does not take into account the farming system, but because it is isolated from the social, economic and institutional constraints farmers deal with.

Too often, standardized extension recommendations do not take into account regional and local agroecological and socioeconomic differences. Shelf technology, if there is any, has more often than not been developed on a research station under monoculture conditions, and has not been evaluated and adapted under real farming conditions. This is especially problematic for small farmers whose complex farming conditions are very different from the controlled research conditions on experiment stations.

Given these circumstances, it is not surprising that small farmers do not adopt the technology offered by extension. While farmers may be characterized as traditional and "laggards" because they do not adopt the technology packages recommended, they are in fact often wise not to. Small farmers may be poor, but they are not stupid; as a matter of survival, they have learned to avoid risky technology.

On the other hand, farmers repeatedly have demonstrated a willingness to adopt new technology when it represents a clear improvement over their existing technology. But technology has to be an improvement as measured by <u>their</u> technical and socioeconomic values, or evaluation criteria, not only those of researchers. This calls for doing research on farmers' fields, under their management practices and with their participation in the process.

In the last two decades, recognition of these problems has resulted in a proposed solution -- a technology development methodology known as "Farming Systems Research" (FSR) which has at its core on-farm, adaptive research. It is not a substitute for on-station research, but rather a means for exposing station and other research results to a wider range of environments and potential users. By doing so, it increases the rate of return on investments in research.

A Solution: Farming Systems Research

There has been a tendency for research to become more and more specialized as study of the agricultural production process has been divided into smaller and smaller components. Subdividing a

phenomenon into small discrete components may be consistent with science, but it is not consistent with agricultural development which requires an understanding of whole agricultural processes.

In general, researchers have studied agricultural processes as if they were isolated phenomena: "Soil scientists measure fertilizer responses, agronomists breed 'better' varieties, crop protection specialists identify 'better' pesticides, and agricultural economists analyze single-product marketing systems. The technology generated by isolated agricultural research is expected to somehow produce agricultural development" (Hart & Pinchinat, 1982:559).

Interest by research institutions in farming systems reflects the recognition that specialized knowledge alone cannot provide the technology needed for complex agricultural processes. A farming systems approach to research responds to the intricate nature of agricultural development by attempting to integrate the components of the farm subsystem with those of the agroecosystem and regional system (see Figure 1).

For technology to be useful to small farmers, it cannot be generated piecemeal, but must be part of a comprehensive farming systems approach. This requires the integration of researchers from more than one discipline in order to understand the farm as an interacting system, rather than isolating system components. It demands that science move to farmers' fields, enlist their participation and deal with the multi-dimensional problems they face.

Research on farming systems is often more complex than commodity research. This is especially true when trying to develop technology for small farmers growing a multiplicity of crops (and animals) in a wide array of systems under marginal hillside and rainfed conditions, as in the case of Jamaica. The research agenda becomes even more complicated when the goals of sustainability and equity are added.

While the term "Farming Systems Research" has fallen into disrepute in some circles, including donors, this is unfortunate

because the concepts are important for any national research organization whose goal is to develop small-farmer technology. According to Sands (1985), FSR is 1) systems-oriented; 2) a problem-solving approach; 3) interdisciplinary; 4) complements commodity and disciplinary research; 5) tests technology in on-farm trials; and 6) provides feedback from farmers.

To this we can add that FSR is farmer-group specific in that on-farm research is planned with the circumstances and problems of specific farmer groups in mind. Farmers who have similar farming systems have similar problems (and opportunities) and thus require a common experimental program. A preliminary step in FSR, therefore, is identification of homogeneous groups of farmers (called research/recommendation domains).

In FSR, technologies are evaluated from farmers' points of view, taking into account their production objectives, resource endowments, access to inputs, and attitudes toward risk. Experience shows that farmers' collaboration in the research process is more cost effective than approaches in which researchers seldom interact with farmers (Ashby, 1987).

Although operational strategies vary, the general FSR approach involves the following (see Figure 2):

1. Selection of target areas and farmers' situation diagnostic (agro-socio-economic).
2. Grouping of farmers into homogeneous farming systems (research/recommendation domains).
3. Planning and design of technological solutions to group-specific problems.
4. On-farm technology testing and evaluation.
5. Multi-locational trials for technology adaptation/integration and refinement of recommendation domains.
6. Targeted dissemination (diffusion domains); continual characterization of farming systems; farmer feedback.

It is important to note that the FSR sequence crosses the research/extension division. Ideally, extension agents participate

in all stages of the process from diagnostic to on-farm trials to technology dissemination. Additionally, extension plays an important role in identifying the support services necessary for technology utilization by farmers (i.e., chemical inputs, credit, etc.). Figure 3 presents a general model for organizing on on-farm adative research. Figures 4 and 5 show the limited reach of extension messages from station research compared to the broader reach of multiple extension messages from on-farm research.

Much has been said in recent years about the importance of research-extension linkages. In some instances, FSR has been envisioned as FSR/Extension. Undoubtedly, FSR/E has helped to improve the linkages between research, extension and farmers by bringing them together during on-farm and multi-locational trials (Figure 2, steps 4 and 5).

Unfortunately, it is more common to involve extension agents primarily in the dissemination step (6). To be effective, agents should be involved in all steps so that they share responsibility with researchers for technology development. Likewise, researchers should share responsibility for technology dissemination. Finally, FSR/E is above all farmer-oriented -- it is technology development and dissemination with, not for, farmers.

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Figure 1 THE HIERARCHICAL RELATION BETWEEN REGIONS, FARMS, AGRO-ECOSYSTEMS AND CROPS

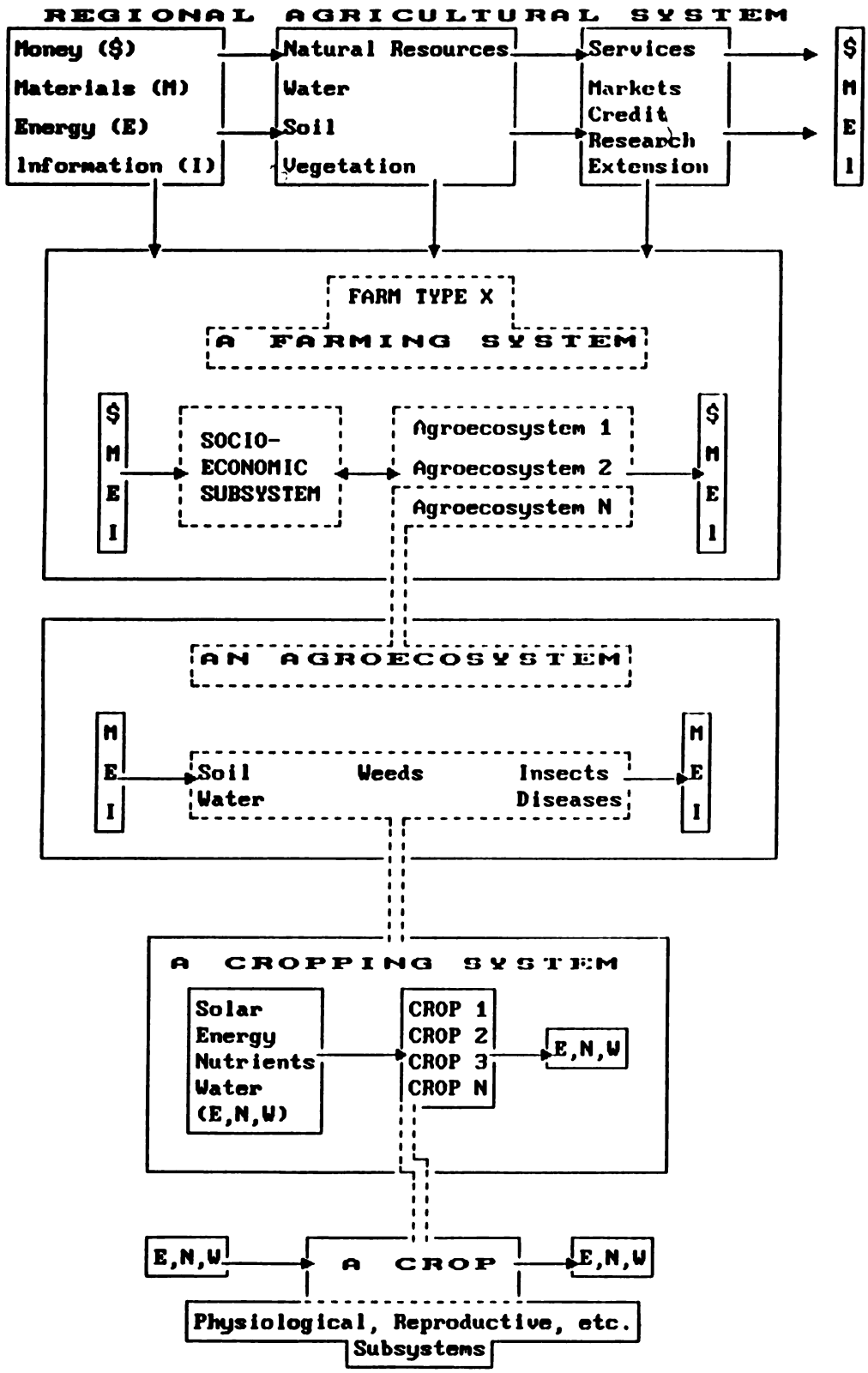
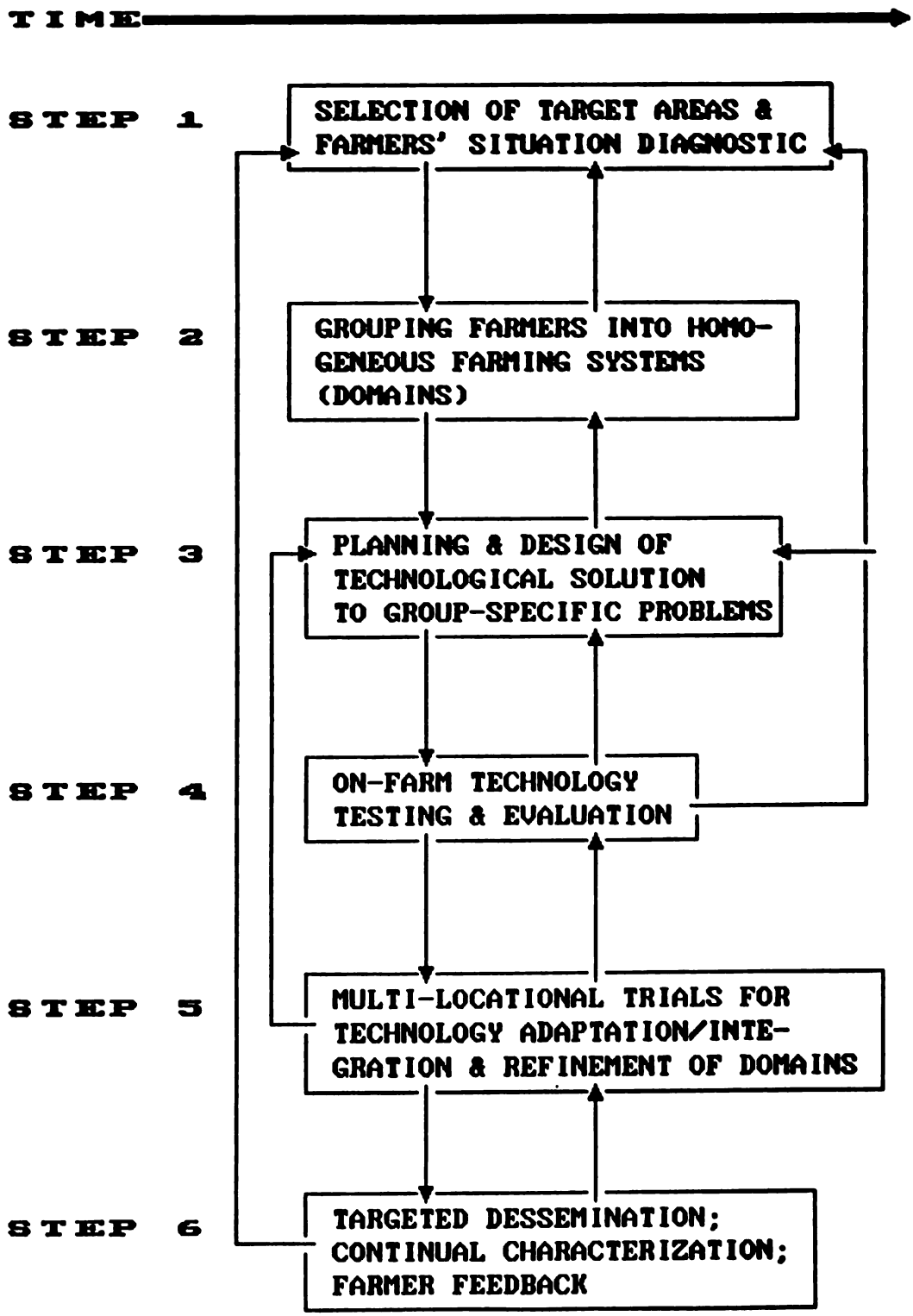


Figure 2 General Steps to FSR Approach



NOTE: The arrows indicate that steps overlap in time and results in later steps may require going

Figure 3 A MODEL FOR ORGANIZING ON-FARM ADAPTIVE RESEARCH

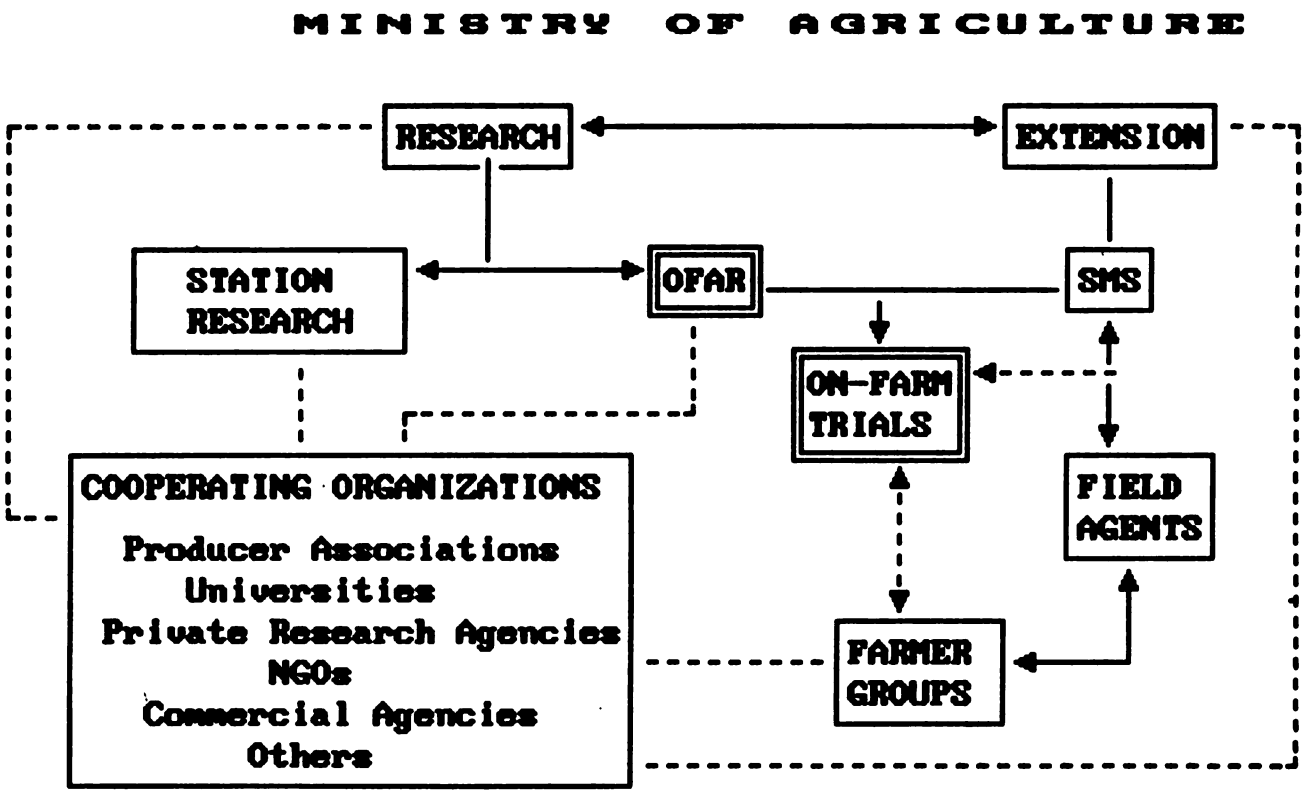
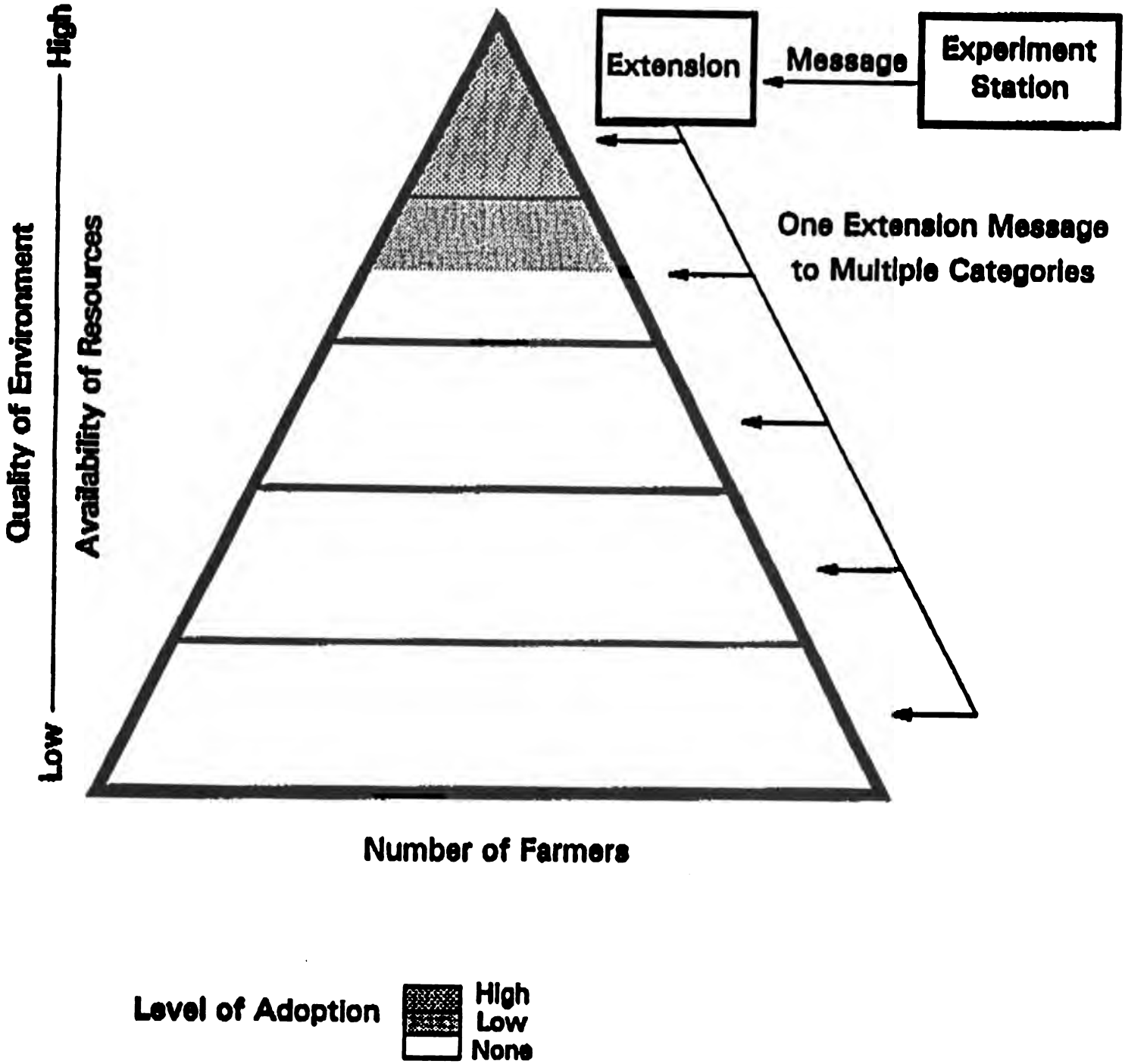
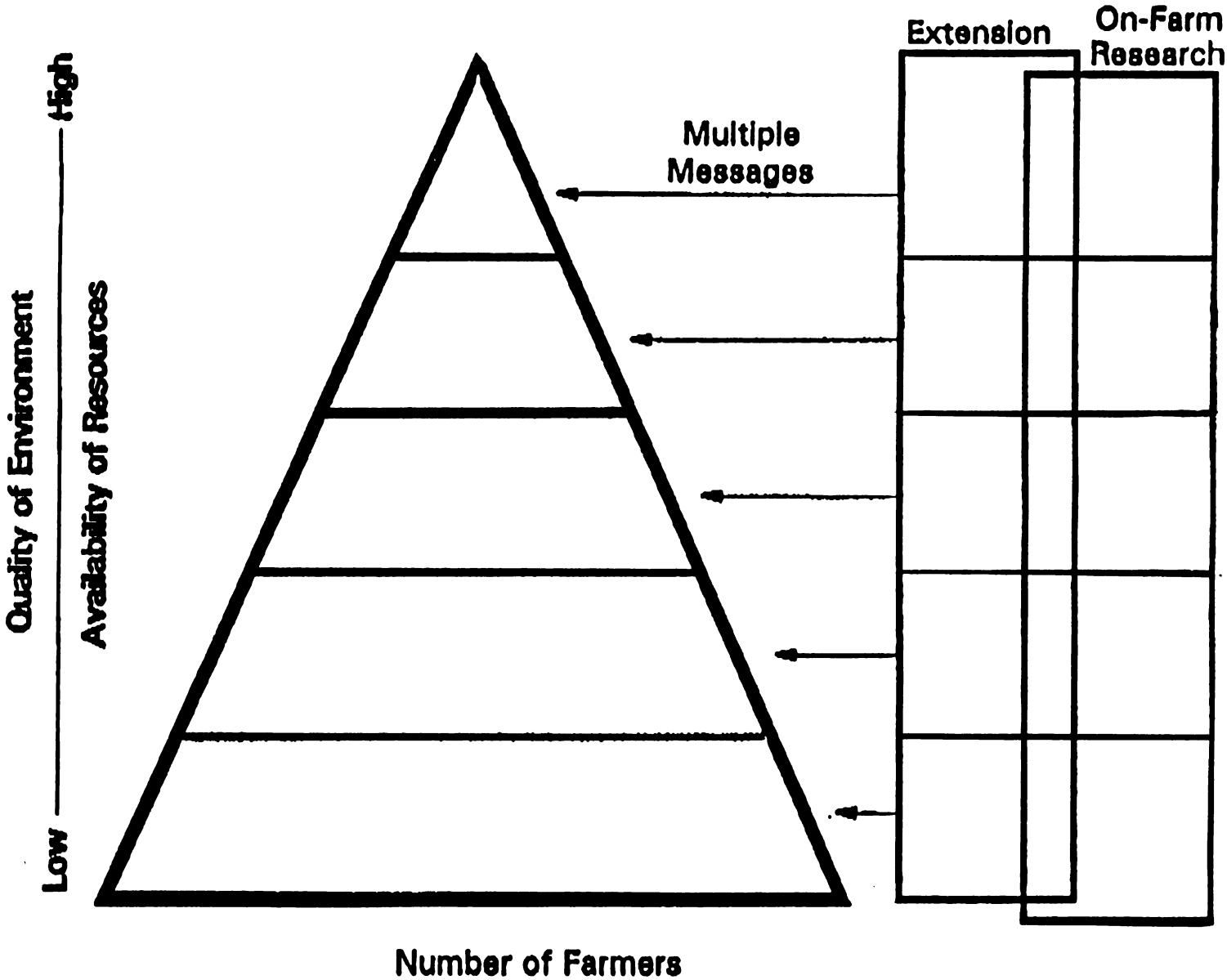


Figure 4. Developing an Extension Message from an Experiment Station.



SOURCE: P. Hildebrand, University of Florida

Figure 5. Developing Multiple Extension Messages from On-Farm Trials.



SOURCE: P. Hildebrand, University of Florida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