



AgEcon SEARCH

RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

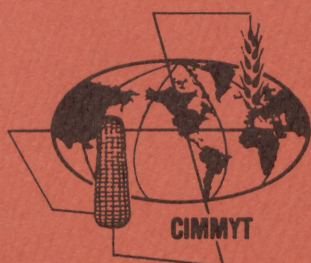
*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

630.72
I57
I778

Issues in Organization and Management of Research with a Farming Systems Perspective Aimed at Technology Generation

Proceedings of a Workshop



ISNAR

WAITE MEMORIAL BOOK COLLECTION
DEPT. OF AGRIC. AND APPLIED ECONOMICS

Centro Internacional de Mejoramiento de Maíz y Trigo

International Service for National Agricultural Research

The International Maize and Wheat Improvement Center (CIMMYT) is an internationally funded, nonprofit scientific research and training organization. Headquartered in Mexico, CIMMYT is engaged in a worldwide research program for maize, wheat, triticale and barley, with emphasis on food production in developing countries. CIMMYT is one of 13 nonprofit international agricultural research and training centers supported by the Consultative Group for International Agricultural Research (CGIAR).

The International Service for National Agricultural Research (ISNAR) began operating at its headquarters in The Hague, Netherlands on September 1, 1980. It was established by the Consultative Group on International Agricultural Research (CGIAR), on the basis of recommendations from an international task force, for the purpose of assisting governments of developing countries to strengthen their agricultural research. It is a non-profit autonomous agency, international in character, and non-political in management, staffing, and operations.

ISNAR is the only center within the CGIAR network which focuses primarily on national agricultural research issues. It provides advice to governments, upon request, on organization, planning, manpower development, staff requirements, financial and infrastructure requirements, and related matters, complementing the activities of other assistance agencies. In addition, ISNAR has active training and information programs which cooperate with national agricultural research programs in developing countries.

ISNAR also plays an active role in assisting these national programs to establish links with both the international agricultural research centers and donors.

CIMMYT and ISNAR are supported by a number of members of CGIAR, which is sponsored by the Food and Agriculture Organization (FAO) of the United Nations, the International Bank for Reconstruction and Development (World Bank), and the United Nations Development Programme (UNDP), and which is an informal group of more than 30 donors; it includes countries, development banks, international organizations and foundations.

Citation:

Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT), and International Service for National Agricultural Research (ISNAR).

Proceedings of a Workshop. Issues in Organization and Management of Research with a Farming Systems Perspective Aimed at Technology Generation. 1984. Edited by M. Joseph Chang. The Hague, Netherlands.

630.72
I57
I778

Issues in Organization and Management of Research with a Farming Systems Perspective Aimed at Technology Generation

**Proceedings of a Workshop
The Hague, Netherlands
September 27-30
1983**

**Centro Internacional de
Mejoramiento de Maíz y Trigo
(CIMMYT)**

Apdo. Postal 6-641
06600 Mexico, D.F.

**International Service for
National Agricultural Research
(ISNAR)**

P.O.Box 93375
2509 AJ The Hague
Netherlands

3. Technical Presentations

3.1 Recent Views on Farming Systems

D. Winkelmann*
Director of the Economics Program, CIMMYT.

Introduction

Most agricultural research seeks to enhance the efficiency of resources committed to agriculture, usually through improved technologies and through the fashioning of more appropriate policies and institutions. The principal concern in this paper is with the development of improved technologies, and with the recent emphasis on appropriate technologies for representative farmers of developing countries. This paper reports on selected aspects of such research, concentrating on the process of technology generation with a systems perspective. Its purpose is to develop a common point of departure for subsequent discussion about managing such research.

The paper has three parts, organized around different themes. The first part provides a brief perspective on the evolution of agricultural research. The second treats what has come to be called farming systems research. The last deals with that component of farming systems research which is of central importance to the ISNAR/Workshop.

The Antecedents

Systematic, formal research on improved agricultural technologies dates from the mid-19th century with work on the biological sciences undertaken in Europe. Early efforts were usually in the hands of publicly supported research entities. By the early 20th century, most of the research effort tended to be closely focussed on the immediate problems of farmers. Throughout the 20th century, reinforced by an expanding scientific knowledge base and the introduction of formal extension networks, a growing proportion of research was aimed at more fundamental problems. Immediacy and the farmer

were still important, but basic research and professional peers received even more consideration, especially in publicly supported centers. The trend there was towards specialization in disciplines.

Simplifying, but not unduly, it can be said that the evolution of agricultural science found great success in what has come to be called a reductionist approach. The underlying paradigm is that understanding – and with it the capacity to guide and to orchestrate – comes from reducing the whole into parts/partial problems for study, with understanding/solutions of the parts leading to understanding/solutions for the whole. This paradigm works wonderfully well, especially where interactions among the parts were not important, that is, where the whole is essentially the sum of its parts. The successes encouraged the emphasis on disciplines, for better understanding of the parts, which in turn fostered ever more understanding of ever more refined parts. And with the disciplines came, as accompaniments, disciplinary standards, and norms to guide and evaluate the work of adherents.

In the 1940s and 1950s, some centers began giving more relative emphasis to commodities, combining specialists from various disciplines around the problems of a specific commodity. Even so, for the most part, the organizing format for research rested on individual disciplines.

Through this period commercial interest in agricultural research developed, with rapidly rising commitments after World War II. Here the accent was more on the immediate needs of farmer clients as commercial firms competed for the profits promised by the resolution of significant production problems.

From the 1960s on, it was evident that the entire research process, public and private, was yielding dramatic results in developed countries through widely adopted technologies and rapid increases in productivity.

* The views expressed here are not necessarily those of CIMMYT.

It should be noted that the disciplinary/reductionist approach was not devoid of attention to the systems which farmers operated. Many researchers, and especially those from commercial firms, were conscious of the systems within which their recommendations would have to fit. At times the improvements they were offering were so large that they compensated for market changes in the systems and those changes could be sustained by the capital of the farmers. What was being advocated, then, was not a totally new process but a substantive shift in emphasis.

Much of the interest in the systems perspective has coalesced around the term "farming systems research." Who first used the term is less important than is the explosion in its use since the 1970s. Its appearance in articles in agriculture, ecology, and economics has mounted steadily, giving evidence of the widening awareness of its promise.

Among the better known early attempts to introduce into research on technology the elements which are now said to describe "farming systems research" were Mexico's Plan Puebla, the work at Ahmadu Bello University in Nigeria, ICA/IDRC's Caqueza effort in Colombia, ICTA/RF's Guatemala initiative (Hildebrand). From reports and published papers of the time, it is possible to derive a sense of what the strategy was then thought to entail. The major elements of emphasis are listed in the first column of Table 1. They, along with elements in columns two and three, were derived from reports of the time.

Table 1. Adjectives commonly used to describe FSR at three times.

	1972	1977	1982
Conceptual:			
Farmer centered	XX	XX	XX
Societal needs			X
Technology generation	XX	XX	XX
Policy implications		X	X
Rural development needs			X
Operational:			
Interactions	XX	X	X
Holistic		XX	XX
On-farm	XX	X	XX
Near term			X
Interdisciplinary	X	XX	XX
XX = Stressed X = Included			

From early on, proponents have emphasized the need to link FSR research with research undertaken in experiment stations and with extension activities. Some of that research will be discipline oriented. How that linkage is to be sustained over time was not made clear and indeed that point is one of the themes of the ISNAR/CIMMYT Workshop. Clearly, however, the argument was not to replace one class of activities by another but to modify the emphasis. Furthermore, there has been a continuing recognition that the system includes, or ought to include, consideration of livestock. Even so, most attention still focuses on crops and, most specifically, on food crops.

By the mid-1970s, development assistance agencies were manifesting an increasing interest in farming systems research, developing country research directors were stepping forward to test its promise, and several of the international agricultural research centers had programs.

Indeed, so much activity and interest were in evidence that the CGIAR commissioned, through TAC, a review of the farming systems research programs in the IARCs. That review concluded, among other things, that FSR refers to research which views the farm in a holistic manner (with interactions emphasized), that the terminology of FSR is confusing (a vocabulary was included), and that FSR is a valid and essential activity for the IARC system. This CGIAR review has served as a point of departure for much of the subsequent discussion on farming systems research. Its sense of what constituted farming systems research is portrayed in the second column of Table 1.

In the years since the report, the issues have become more varied and the terminological difficulties more acute. It is little wonder that terminology is a problem, as ideas which had their roots in biology, ecology, and economics will almost certainly be described with different terms by adherents of the three disciplines. Add to that the terminological preferences of agronomists, anthropologists, sociologists, and systems specialists, and lapses in communication should be expected.

But it is more than this. Farming systems research has come to mean a great many things, depending on the user. As evidence of this, the third column of Table 1 presents a synthesis of the current sense of the term as evidenced by literature currently cited. The whole farm (holistic) concern has gone from awareness and knowledge to understanding. While technology generation remains at the forefront, other themes receive more emphasis, for example, policy, infrastructure, and – for some – rural development.

And it is not only the farmer's decision criteria which must now be satisfied, but that of society as well (Baker, et al.).

By now, according to one source, "... there is little activity concerned with agriculture and rural development which cannot claim some relationship with farming systems research), however tenuous. Further, the breadth of activities included in FSR underlies both the growing consensus about its desirability as well as the considerable diversity of opinion about how it should be organized and undertaken." (Gilbert, et al.)

With this range of potential topics and this diversity of opinion about methods, research administrators might be reluctant to commit resources to farming systems research. What is to be done? How is it to be done? What will be the utility of results? What expectations are being created for potential users of results? With these as relevant questions, a certain apprehension or skepticism is understandable.

Against this ambiguity, this uncertainty about topic and method, some argue for reconcentrating energies on what were the central elements of the case, viz. near-term technology generation for representative farmers with interactions playing a central role in the analysis. That is the tack taken in the ISNAR/CIMMYT Workshop.

Whatever advantages the broader approach offers, the central theme of the workshop covers a more restricted field than the ever growing terrain of farming systems research. This clear determination concentrates the discussion. It should have the further advantage of relieving at least some apprehension about the availability of suitable methodologies and of reducing the range of opinion about which of those are appropriate.

The Elements for Emphasis

Earlier, it was claimed that developing country research has not, for differing reasons, had the success that was projected and that one important reason is insufficient focus on the special problems of representative farmers. One interpretation of this charge is that researchers saw no need to single out the problems of representative farmers. Moreover, with capital, infrastructure, and market insufficiencies, with farmers regarded as so bound by tradition as to reject even what was held to be in their best interest, and with disparagement on all sides about the extension services, there were many ways to explain the shortcomings of research. However, a new view is gaining ground which argues that, in spite of the other shortcomings in the environment,

there is still scope for effective research and that to be effective, new dimensions will need emphasis and new practices must be followed. At the center of this view is recognition of the crucial role of interactions – synchronic and diachronic, biological and economic, production and familial.

Starting with emphasis on near-term technology generation for representative farmers and with the recognition of the role of interactions among enterprises in shaping their decisions, a class of research has evolved which features collaborative interdisciplinary work, based on the needs of a defined set of farmers, and with a great deal of on-farm activity. The process has a variety of names, e.g., at CIMMYT it is called on-farm research with a systems perspective.

This has brought to the fore a new set of considerations in organizing research. In a general sense, the several methods that have evolved or have been adapted for its undertaking have much in common. First, there is the question of which farmers are to be served, their identification being guided by societal concerns. That question answered, attention shifts to assessing, describing, and diagnosing the circumstances of those farmers. But not all circumstances are identified, only those are singled out which are thought to impinge in important ways on productivity.

At this juncture opinions differ. Some advocate going to the countryside with an open mind as to what problems will be researched, in effect leaving all aspects of the farmer's system open to investigation (Baker, et al.). Others argue for concentrating early attention on the most measurably important enterprise or enterprises of the farmer, treating other activities as fixed, but recognizing their complementarity and competitiveness with the enterprises under scrutiny. Proponents of the first approach are concerned about missing new opportunities, while those of the second point to probable payoffs derivable from the focussed commitment of scarce research resources.

In either case, this step has as its end the identification of potential problems and provides a framework against which potential solutions to those problems can be assessed. If asked, most would agree that the identification of problems is far easier than is the identification of appropriate solutions to those problems. The class of research under consideration gives heavy emphasis to the latter.

The next step involves establishing priorities for the experimental activities. These priorities are heavily influenced by a ranking of significant problems of representative farmers. These priorities, too, are

fixed against the background of the circumstances of representative farmers.

Next is experimentation under representative farmers' circumstances. Given the differences commonly found between these circumstances and those of the experiment station, it is usually preferable to carry out experimentation in the fields of the farmers. This preference raises the probability of close farmer involvement in the experiments. The participation by the farmers can increase the relevance of the trials and the correctness of judgement about appropriateness. One point here: the trials, their scope and organization, are guided by hypothesis testing. These are not "demonstrations," but can serve that role, and they are not necessarily simple adaptation.

And finally there is the issue of diffusing the technology after sufficient trials have been undertaken. The method of transferring the recommendations will differ from place to place because of differing relationships between research and extension. Most would agree, however, that on-farm research itself represents an excellent opportunity for involving extension staff. With effective collaboration, by the time recommendations have been framed, agents are already fully aware of the characteristics of the improved technology.

To summarize, the process features singling out groups of farmers in terms of society's concerns, assessing the circumstances of those farmers, assigning priorities to experimentation on apparently appropriate solutions to important problems, and undertaking experiments under the circumstances of representative farmers. Characteristics of the process are collaborative, multidisciplinary research, much of it done on farms and most of it based on the immediate needs of representative farmers. The desired objectives are useful recommendations which will lead to increased productivity in the near term.

The purpose of the workshop is to talk about the management issues associated with integrating such research into conventional, publicly supported research systems. There are myriads of possible questions; an idea of their range follows.

Who should carry out such research? Some argue that specialized teams are essential while others hold that the on-farm research should be undertaken by the same staff that currently works on experiment stations.

How will the work be evaluated? Currently research tends to be evaluated in terms of the criteria established by disciplines. To shift to other standards is itself a problem. To shift to a standard which might

include the diffusion of the results of research adds further complications.

How will incentive systems be maintained?

The rewards must induce a lasting commitment to the process, should compare favorably to those already sustaining interest in disciplinary research, and must be sufficiently broad as to recognize the contributions of those whose products are themselves inputs into the process. Furthermore, the incentives may have to overcome reluctance based on hardship and problems of status ambiguity.

How will communication be maintained with other parts of the research apparatus? To be truly effective there must be considerable exchange between on-farm researchers, station researchers, and other researchers. Such communication is costly.

Who will be responsible for making recommendations and for dealing with extension service?

What local and central administrative frameworks are required to sustain extensive on-farm research over an extended period of time?

How will training for on-farm research be undertaken? The process seems to lend itself to learning by doing and favors training *in situ* with considerable follow-up. If so, it is unlikely that the kind of training which supports and sustains the disciplines will suffice.

The above are but a few of the questions particular to the management of on-farm research with a systems perspective. There are others. How effectively they are answered will have a marked influence on the extent to which the approach fulfills its promise.

References

- Baker, D., E. Modiakgotla, D. Norman, Subert, and M. Tjirongo. Helping the Limited Resource Farmer through the Farming Systems Approach to Research. Culture and Agriculture, No. 19, Spring, 1983.
- Byerlee, D., L. Harrington, D. L. Winkelmann. Farming Systems Research: Issues in Research Strategy and Technology Design. American Journal of Agricultural Economics, Vol. 64, No. 5, December 1982.
- CGIAR, Technical Advisory Committee. Farming Systems Research at the International Agricultural Research Centers. Rome: TAC Secretariat, 1978.

Collinson, M. Farming Systems Research in Eastern Africa: The Experience of CIMMYT and Some National Agricultural Research Services, 1976-81. Int. Dev. Pap. No. 3, Michigan State University, 1982.

Dillon, J. L. The Economics of Systems Research. *Agricultural Systems* 1(1):3-20, 1976.

Gilbert, E. H., D. W. Norman, and F. E. Winch. Farming Systems Research: A Critical Evaluation. Rural Develop. Pap. No. 6, Michigan State University, 1980.

Hart, R. D. One Farm System in Honduras: A Case Study in Farm Systems Research. Paper presented at Farming Systems Research and Development Workshop, August 2-4, 1979, Consortium for International Development, Fort Collins, Colorado.

Hildebrand, P. E. Incorporating the Social Sciences into Agricultural Research: The Formation of a National Farm Systems Research Institute. Report of a Five Year Tour of Duty. ICTA, Guatemala. 1979.

Shaner W. W., P. F. Philipp, and W. R. Schmehl. Farming Systems Research and Development: Guidelines for Developing Countries. Boulder, Colorado: Westview Press. 1982.

Waugh, R. K. Informe Anual 1975-76 del Equipo de Producción A, Prueba de Tecnología. ICTA, Guatemala, 1976.

Zandstra H. G., K. Swanberg, C. Zulberti, and B. Nestel. Caqueza: Living in Rural Development. (IDRC-107e.) Ottawa: International Development Research Centre. 1979.