Report of a Seminar

Women and Agricultural Technology: Relevance for Research

Volume 2 - Experiences in International and National Research

The Rockefeller Foundation

International Service for National Agricultural Research

Citation:

The Rockefeller Foundation and International Service for National Agricultural Research. Women and Agricultural Technology: Relevance for Research. Volume II - Experiences in International and National Research. 1985. The Hague, Netherlands.

Report of a Seminar

Women and Agricultural Technology: Relevance for Research

Volume 2 - Experiences in International and National Research

Report from the CGIAR Inter-Center Seminar on Women and Agricultural Technology
Bellagio, Italy, 25 to 29 March 1985

July 1985

The Rockefeller Foundation
1133, Avenue of the Americas, New York, NY 10036, USA

International Service for National Agricultural Research
P.O. Box 93375, The Hague 2509 AJ, Netherlands

Technology Users' Needs and Research Priorities at IRRI

by

L.J. Unnevehr

with assistance from
C.C. David, J. Dey, and J.A. Litsinger

International Rice Research Institute

TECHNOLOGY USERS' NEEDS AND RESEARCH PRIORITIES AT IRRI[1]

We have been asked to write about "experiences with identification of categories of technology users, their needs and potentials, and the incorporation of this knowledge into center activities". Understanding users' needs and communicating them to biological scientists and research administrators is the responsibility of the economics program at IRRI. The first section of this paper outlines the role of economics and other social sciences at IRRI. The second section then reviews three examples of how user issues have been incorporated in research goals:

1) the allocation of research efforts across production environments;

2) the development of integrated pest management;

3) screening varieties for better grain quality.

The paper concludes with a discussion of IRRI's past and current efforts to consider women users.

THE ROLE OF ECONOMICS AND OTHER SOCIAL SCIENCES AT IRRI

IRRI's mandate as formulated in its Articles of Incorporation is "to conduct basic research on the rice plant, on all phases of rice production, management, distribution and utilization with a view to attaining nutritive and economic advantage or benefit for the people of Asia and other major rice growing areas". In recent years, research on rice-based cropping systems has been added to IRRI's responsibility. Dissemination of research findings and training of rice scientists for developing countries are other important components of IRRI's mission.

The economics program has been designed to support and complement the biological research. Four closely related research objectives that meet this criteria provide the framework for IRRI's economic research.

1. Identify the factors that impede rice production increases and rice-based cropping systems production increases, and assist in designing technology that might overcome those factors.

2. Assess the social and economic viability of newly developed or proposed technological improvements designed to increased production.

3. Identify restrictions that impede the adoption and effective utilization of new technology.

---

[1] This is the IRRI background paper for the Inter-Center Seminar on Women and Agricultural Technology. It was prepared by L.J. Unnevehr with assistance from C.C. David, J.Day, and J.A. Litsinger. The first section draws heavily on an earlier paper by R. Barker and R.W. Herdt.

4. Assess the impact of new technology on production, prices, incomes and income distribution, and evaluate policies that may improve those impacts.

The primary targets for IRRI economic research are the biological scientists at the Institute and the administrators who influence the activities of those scientists. Identification of factors impeding production is the first step in designing a biological, agronomic or technical innovation to overcome such factors. This requires a description of the environmental and economic conditions facing farmers - conditions which scientists sometimes do not accurately perceive. Economists are often asked to understand and explain why certain techniques or technologies are unacceptable to farmers. Given the reasons, biological scientists may then be able to redesign innovations to make them acceptable. Certain potential innovations may have consequences that will be unacceptable. If these can be identified in advance, research resources can be more usefully directed.

An example of interdisciplinary research with biological scientists is the intensive agro-economic research effort aimed at understanding the potential yields possible using new rice technology on farmers' fields and the reasons why farmers apparently are not achieving those yields. The experiments and associated surveys for this project have been jointly designed by economists and the biological scientists involved.

The second audience of IRRI economists are the economists in rice-producing countries. To some extent, IRRI economics provides them with information to help them better understand modern rice technology. However, the main objective is to encourage them to focus their attention on the kinds of problems that can make the greatest contribution to increasing rice production. Thus, IRRI economists encourage their colleagues in Asia to undertake research with broad objectives similar to IRRI's own. Much of the training, conference and network activity falls in this category, and so it is difficult to separately identify the resources used for training from those used for research.

The small size of the economics staff, the large size of the geographic area in which rice is grown, and the nature and magnitude of the problems that need attention dictate that the effectiveness of the Agricultural Economics program depends on building and maintaining a wide range of contacts.

The general approach is to undertake initial research on a problem here in the Philippines and to encourage similar research elsewhere through informal contacts, graduate training, seminars, workshops or formal collaborative agreements. An important means of communication is through regular mailing of departmental research papers to about 250 researchers and libraries. Graduate student research plays an important role in generating linkages to researchers in other countires. IRRI economists also maintain close informal contacts with agricultural economists located in regional universities.

Current economic research projects are classified in five categories, although the division is somewhat artificial and projects in one category provide information answering questions raised in other categories.

These categories are:

1) constraints to adoption and high rice yields;

2) consequences of new rice technology;

3) economics of rice-based cropping systems;

4) water management and irrigation economics;

5) economics of small-scale mechanization.

Constraints

The major objective of the economics research in the collaborative agro-economic constraints project is to: (a) measure the economic benefits of new technology under farmers' conditions to identify economically optimal levels of technology and (b) determine whether farmers are using economically optimal levels and if not, why they are not.

Consequences

The main objective of research in consequences is to understand the impact or potential impact of technological change. Past research in this area has examined the impact on demand for fertilizer, irrigation and labor, the impact on distribution of income among laborers, farm operators, landlords and purchased inputs, the impact on land use, and the impact on incomes of small and large farmers.

Cropping systems economics

One of the important dimensions of IRRI's cropping systems research is to develop a feasible organizational pattern and procedure that is capable of developing improved cropping systems adapted to particular, local, environmental sites. The economic component of cropping-system research has a corresponding dimension - developing "field-level" techniques that can be used at sites having particular characteristics.

Irrigation and water management

Research findings of many scientists throughout Asia indicate that the lack of good water control is probably the major factor keeping rice yields low. IRRI water research includes work on soil-water-plant relations and irrigation system management. Economics has contributed evaluations of the costs and benefits of irrigation by various methods.

Economics of small-scale mechanization

The major activities in this area include identification of potential machinery demand, evaluation of the impact of mechanization on employment and labor demand, and evaluation of the post-production rice handling system to identify losses and inefficiencies.

EXAMPLES OF TAKING USERS' NEEDS INTO ACCOUNT

Research efforts across production environment

In its third decade, IRRI's resources are directed more towards rainfed and deepwater environments than efficiency (i.e. expected benefits) alone would dictate (IRRI, 1982). Equity considerations justify the concern to develop technologies to increase incomes in the favorable environments. This decision represents the culmination of discussions within IRRI and the donor community about the impact of modern varieties (MVs) in irrigated environments.

Barker and Herdt (forthcoming) describe the situation in the early 1960s:

> "The new seed-fertilizer technology was developed in experiment stations of Asia which were favored by fertile soils, well controlled water and other factors suitable for high production. There was little perception of the complexity and diversity of the physical environment in rural South and South East Asia. In retrospect this proved to be a mixed blessing. If the modest research resources available to the international agricultural research systems in the 1960s had been concentrated on the less favorable environments, no major breakthrough would have been made. However, the scientist frequently saw his job and responsibility as ending at the experiment station gate. The failure of farmers in many areas to adopt to modern rice technology was attributed initially to peasant conservatism and backwardness and to the failure of extension to do its job in disseminating the technology."

Later studies in the Economics program addressed the "Constraints" to use of new technology on farmers' fields and the "Consequences" of technology for production and income. Briefly, the Constraints studies found that lower yields on farmers' fields were primarily due to their rational response to economic incentives (IRRI, 1977; Herdt and Mandac 1983). Consequences studies showed that MVs and fertilizer were widely adopted within irrigated and favorable rainfed environments. Adoption did not vary by size of farm or tenancy status. Furthermore, because the new technology tended to increase demand for hired labor, the benefits were fairly broadly distributed among landowners, operators, and landless workers (IRRI, 1984; Barker and Herdt, forthcoming). The new seed-fertilizer technology definitely expanded rice supply; it also seems to have raised incomes in irrigated areas.

There was a growing realization, however, that the new technology had reached only one out of every four farmers in Asia. Thus farmers in non-irrigated environments were identified as a "special user group" that required particular research focus. The shift away from research on irrigated environments was the response to this identification.

Development of integrated pest management

High yields and multiple rice cropping spurred by irrigation led to rice pest epidemics soon after the Green Revolution. Severe pest damage to MVs in the Philippines and Indonesia in the early 1970s raised concern about the stability of high yields. Because of a perception that small farmers could not afford insecticides, breeding efforts were focused on development of varieties with multiple pest-resistance to broaden the arsenal of control weapons. IR36, resistant to three insects and three diseases, was released in 1976 and is now the world's most popular rice variety.

Resistance alone cannot solve the pest problems and pesticides' role remains as the course of last resort. In addition to the need to reduce the insecticide costs, it was also recognized that farmers often misuse pesticide. Such misuse is not only expensive but may actually exacerbate pest problems by killing beneficial parasites and predators. As part of the cropping systems program at IRRI, a program was started to develop and teach an integrated pest management strategy to farmers which focused on using pesticide only when needed (economic threshold levels reached) and thus to spare natural enemies. The program was successful in teaching farmers to correctly diagnose and quantify pest problems and to thereby use insecticides judiciously and economically (Litsinger, 1983).

It should be noted that in developed countries integrated pest management is approached in a very different way. Varieties are not commonly bred for pest resistance and farmers hire consultants to monitor pest levels and advise on control measures. IRRI recognized that small-scale farmers in Asia would need a lower-cost strategy. The response was to develop pest-resistant varieties and a program to extend pest management information.

Screening varieties for better grain quality

In addition to considering producers' needs, IRRI also considers rice consumers when selecting rice varieties. The MVs first released by IRRI and national research programs in the 1960s had a reputation for poor appearance and cooking quality. The semidwarf parents of IR5 and IR8 gave them a chalky "white belly", low head rice (whole grain) recovery, and a hard cooked texture. Grain appearance and milling recovery were improved by selection of translucent grain. Beginning with IR20 in 1970, all later varieties have acceptable physical quality, but most still have a hard cooked texture. High yields and pest resistance were the most important plant breeding goals and the best lines had poor cooking quality. The sacrifice of cooking quality was seen as necessary to meet the growing demand for food in Asia. Thus an implicit decision was made that consumers would prefer more rice and a lower real rice price instead of further quality improvements.

Asia rice production grew faster than population from 1965 to 1980 as a result of MVs, irrigation and fertilizer. The real price of rice declined in world markets and several Asian countries between 1975 and 1983 (Flinn and Unnevehr, 1984). Greater supply and falling rice prices have increased consumer demand for rice grain quality and national program concern for quality improvement. Improved cooking and eating quality is one of the main goals of IRRI's breeding program for irrigated environments in the 1980s.

The Agricultural Economics and Cereal Chemistry departments at IRRI have undertaken studies to extend our understanding of consumer preferences for cooking quality. Past studies have established the quality measures used to screen material in breeding programs. Current studies test whether Asian consumers in different countries have similar preferences for rice grain quality and thus whether quality improvement should be undertaken by national or international breeding programs.

Women as users of rice technology

Women provide one-half of the labor in South Asian rice cultivation and one-third of rice labor in many South East Asian countries (Unnevehr and Stanford, 1983). Asian farm women also supervise agricultural labor, select and store rice seed, and market the rice crop. In the Philippines, where IRRI is located, studies by the Agricultural Economics Department show that women play a more limited role in rice field labor than in most other Asian countries. They provide only about 12% of labor in Iloilo (Res 1983) and 19% in Central Luzon (Gonzales and Guino 1979), the two major rice-growing areas of the Philippines. Smith and Gascon (1979) found that wives and children in Laguna farm families have never contributed significantly to farm work, either before or after adoption of MVs. Res (1983) also reports that vegetables and livestock are much more important sources of women's income than rice cultivation. Thus in the environment immediately surrounding IRRI, rice is of limited importance to women and vice versa, even though rice is a very important source of income for women elsewhere in Asia.

Although IRRI's consequences program has produced a large number of studies of the employment and income distribution effects of new rice technology, it was clear that our understanding of the implications for women was incomplete. Therefore IRRI organized a seminar on Women in Rice Farming Systems (WIRFS) in September 1983 that brought together 78 participants from 27 countries. The substance of this conference is reviewed in the Asia regional background paper for the Inter-Center Seminar on Women and Agricultural Technology. The inter-center seminar is in fact one of the recommended follow-up activities of the WIRFS conference.

IRRI is currently developing a proposal for a research network on women in rice farming. The challenge will be to develop a framework to bring together social and natural scientists to promote development of rice technologies most appropriate to women's needs, in terms of both welfare and production goals.

General Remarks

In the above examples, "users" have been very large categories: farmers in adverse production environments, small-scale farmers, and rice consumers. This broad approach is appropriate for setting research priorities at IRRI, because technologies developed here must be appropriate to large areas. It is the responsibility of national research programs to tailor technologies for more specific physical and socio-economic environments. IRRI social scientists can work together with social scientists in national programs to demonstrate how social science work can answer questions about the needs of particular groups, and how such information could be useful in setting research priorities.

REFERENCES

Barker, R. and R.W. Herdt (forthcoming).
Who Benefits from the New Rice Technology?" in The Asian Rice Economy, Johns Hopkins Press.

Flinn, J.C. and L.J. Unnevehr 1984.
"Contributions of Modern Rice Varieties to Nutrition in Asia", in Pinstrup-Andersen et al International Research and Human Nutrition, International Food Policy Research Institute.

Gonzales, L.A. and R. Guino 1979.
"Work Activities of Central Luzon Farm Families: An Age-Sex Analysis", IRRI Ag. Economics paper.

Herdt, R.W. and A. Mandac 1981.
"Modern Technology and Economic Efficiency of Philippine Rice Farmers" Economic Development and Cultural Change, Vol. 29, pp 375-99.

IRRI 1977.
Constraints to High Yields on Asian Rice Farms: An Interim Report.

IRRI 1982.
A Plan for IRRI's Third Decade.

IRRI 1984.
Annual Report for 1983.

Litsinger, J.A. 1982.
"Integrated Pest Management for Rice in Asia" - Paper presented at the IRRI Conference on Women in Rice Farming Systems.

Res, L. 1984.
"Changing Labor Allocation Patterns of Women in Iloilo Rice Farm Households". Paper presented at the IRRI Conference on Women in Rice Farming Systems.

Smith, J. and F. Gascon 1979.
"Effect of the New Rice Technology on Family Labor Utilization in Laguna", IRRI Research Paper Series No. 42.

Unnevehr, L.J. and M.L. Stanford 1983.
"Technology and the Demand for Women's Labor in Asian Rice Farming". Paper presented at the IRRI Conference Women in Rice Farming Systems.