

ADVANCED FARMING SYSTEMS

RESEARCH AND DEVELOPMENT PROGRAM

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WOMEN IN RICE FARMING SYSTEMS (WIRFS) RESEARCH FUNDING PROPOSAL

Many studies document the significant contributions Asian women make in agriculture. Women provide more than one-third of the total labor input in most parts of Asia; in Nepal, South India, Sri Lanka, and Indonesia, they provide more than one-half. Their contributions are particularly significant in jobs involving considerable drudgery, such as transplanting, weeding, harvesting, threshing, and winnowing. They also perform important roles in most aspects of postharvest handling and marketing. As land use intensifies, their participation grows. Their contributions can be expected to increase further with agricultural development.

At the same time, women constitute a disproportionate number of the rural poor. Much of women's agricultural work is as hired wage labor, making their contributions to family income extremely important among landless households. Yet women frequently earn less than men and are more often employed involuntarily. Furthermore, poor women usually are the carriers of survival strategies and are responsible for household production. They work longer hours than men, providing crucial support through their wage labor and farm and household production activities for the poorest households in Asia.

The effects of technological changes in agriculture, animal husbandry, and agriculture on the roles and well-being of women within agricultural households, communities, and society are pervasive. Because of differential access to resources and differential distribution of production benefits, plus limited understanding of intra-household decision-making processes, the development and dissemination of technology may have inadvertently resulted in limited welfare gains, or even adverse consequences, for women.

Farming Systems Research, which introduces a user perspective into technology development, still assumes that the farm household is a homogenous unit that can be adequately represented by the male farmer as the culturally defined head. Extension programs also usually ignore women agricultural workers and decision-makers. Consequently, the traditional user-beneficiaries of technology, agricultural information, extension services, training, credit, and organizational efforts tend to be male farmers.

Gender specificity in labor activities, decision-making in production and consumption, and general well-being among the rural poor is an important issue that needs to be explicitly considered in the design and diffusion of technology as well as in the development of related policies and institutional changes. Ignoring gender specificity leads to technologies and policies inappropriate for growth and equity.

THE WIRFS PROGRAM

Because the International Rice Research Institute (IRRI) is involved in generating technologies for rice-based production systems, there is strong justification for it to pay explicit attention to women as generators, users, and beneficiaries of technology. Explicit attention to women's concerns focused in September 1983, when the Institute convened a conference involving 78 biological scientists, social scientists, and policymakers from 27 countries. They discussed women's roles in rice farming whether women have benefited from the introduction of new rice technology, how women might benefit from emerging technologies, and how women's roles in technology development and transfer might be enhanced. Papers presented at the conference were compiled in the monograph Women in rice farming published in 1985 by IRRI and Gower Publishing Co, USA.

From August 1984 to April 1985, Dr. Jennie Dey, a short-term consultant funded by the Ford Foundation, laid the groundwork for the establishment of a collaborative network. Six countries (Bangladesh, India, Indonesia, Nepal, the Philippines, and Thailand) were invited to participate. Country visits by the consultant identified institutions and researchers interested in participating in the, ascertained the key issues for network research, and discussed appropriate mechanisms to enhance collaboration between national programs and IRRI.

In March 1985, IRRI participated in a Consultative Group on International Agricultural Research (CGIAR)-sponsored Inter-Center Seminar on "Women and Agricultural Technology" at Bellagio, Italy. (This seminar was the outcome of a recommendation made at the 1983 IRRI conference). The seminar discussed incorporating a technology user's perspective, specifically the role of women, into the research programs of the International Agricultural Research Centers. To create greater awareness of women's roles in agriculture and their special needs as technology users and beneficiaries, it was agreed that international and national agricultural research centers should be encouraged to develop long-term strategies for involving women in all phases of research and technology development work.

A project design workshop on WIRFS with this agenda was held at IRRI in April 1985; 33 participants from 9 countries and 16 IRRI scientists attended. A two-volume report details the conceptualization and organization of the network. The workshop recommendations provide examples of the kinds of research that require attention.

Prof. Geilia T. Castillo of the University of the Philippines at Los Banos (UPLB) served as a Visiting Scientist at IRRI from November 1985 to November 1986 to coordinate WIRFS activities at IRRI, in the Philippines, and in other countries that are members of the Asian network. Her report is attached as Appendix I.

In January 1986, using a farming systems approach, women's concerns were examined in a crop-livestock project involving two barrios at Santa Barbara, Pangasinan, Philippines. Processing and marketing glutinous rice were found to be

important traditional income-generating activities for women. Constraints in production and processing were identified. IR65, a high-yielding, early-maturing glutinous rice variety, and Diket, a commonly-grown local glutinous variety, were tested in farmers' fields. IR65 had substantially higher yields, with cooking and eating qualities acceptable to women. Glutinous rice preparation requires considerable fuel and cooking time. Agricultural engineers developed and tested several simple mechanical devices that reduce drudgery, cooking time, and energy requirements.

To provide an additional source of household income, women also were given "hands-on" training in mushroom production using rice straw and other plant residues as substrates. To complement these technologies, programs to spread technical knowledge and to provide training in appropriate skills were introduced for both men and women. Data on decision-making and intra-household allocation of resources were collected to quantify the effects of changing technology on family members, particularly women. The details of this project are provided in Appendix II.

On the basis of the initial results of these initiatives, the 1987 IRRI External Program Review Panel headed by Sir Ralph Riley recommended strengthening WIRFS work at the Institute, including making a stronger commitment to core-supported activities (Appendix III). This recommendation has been endorsed by the Technical Advisory Committee of the CGIAR.

Objectives

The ultimate aim of the WIRFS collaborative program is to institutionalize concerns for women's roles in agricultural research and extension programs on rice farming systems. The specific objectives are:

1. to develop, test and disseminate technology tailored to the needs of women engaged in rice-based agriculture, with the goal of reducing drudgery and increasing women's productivity and income;
2. to identify and promote mechanisms that increase sensitivity to women's needs and to encourage the involvement of greater numbers of women in agricultural research and extension;
3. to evaluate the extent to which researcher concerns promote women's interests and contribute to the positive effects of technical change on the welfare of women and rural households.
4. to identify the institutional and policy framework necessary to enable farm women and women laborers to participate actively in technology development and to derive benefit from technological innovations; and
5. to promote the development of appropriate research and training programs for women within the Asian Rice Farming Systems Network (ARFSN), the International Rice Testing Program (IRTP), and the International Network on Soil Fertility and Sustainable Rice Farming (INSFASURF).

Strategies

To achieve these objectives, the following steps will be needed:

1. incorporate rural women's concerns into ongoing research, extension, and training programs, both in IRRI's collaborative research programs with National Agricultural Research Systems (NARS) and in IRRI core programs.
2. organize WIRFS research in NARS within the ARFSN as well as in appropriate universities and institutions run by nongovernmental organizations; and
3. stimulate research on policy and organizational aspects of the welfare of farm women and women labor, to ensure that they are not bypassed by technological innovations that can raise their productivity and income.

The basic approach will be to work with national programs to identify technologies that match the needs of rice-farming women. This collaboration to undertake action research will be pursued in five program areas:

1. **Women and Technology Development.** The major (but not the exclusive) thrust will be to integrate the concept of women's various roles on the farm and in the household into farming systems research. Mechanisms will be developed to integrate women's concerns at specific stages of the technology development process, specifically during problem identification, design, dissemination, testing, and evaluation. The basic elements involved in this objective are:
 - o identification of women's roles in household and agricultural production;
 - o clarification of the factors constraining or supporting women's participation in farming systems, such as access to or control over production resources;
 - o identification of existing and potential technological options that enhance women's productive capacity; and
 - o testing and adapting of selected technologies by users.
2. **Impact of Technologies on Women and the Household.** The effects of technology on men, women, and children, including sociocultural, institutional, and economic considerations will be evaluated.
3. **Women and Extension.** Missed or foregone opportunities caused by male-oriented approaches in knowledge and skill transfer programs and action research will be identified and analyzed to determine appropriate ways to reach women or to include them in extension programs.
4. **Complementary Studies.** Case studies will examine household behavior dynamics, rural labor markets, policies that affect farm and household decisions, and farming systems and agricultural households in different ecological and socioeconomic settings.
5. **Sensitization and Institutionalization.** Mechanisms will be developed to transfer relevant experience, data, and analyses generated in WIRFS network projects and elsewhere to agricultural scientists, policy-makers, development

administrators, farmers and women themselves. Case studies will be used in seminars for policymakers and research planners and administrators.

Collaborative research activities of the ARFSN will be expanded to include WIRFS. The ARFSN was established in IRRI's cropping systems program in close collaboration with national programs. Sensitization of agricultural scientists, policymakers, and extension workers also will be pursued through the ARFSN.

In addition, explicit attention to women's participation will be introduced into the IRTP (the role of women in seed selection and seed technology will be emphasized here) and the INSFASURF (the role of women in producing and applying biofertilizers will be emphasized here).

Microlevel research on the dynamics of agricultural household behavior, rural labor markets, and the policy environment affecting farm, household, and women's decisions will be linked to macrolevel agricultural economics research at IRRI. Training programs designed to convert unskilled women laborers and farmers into skilled workers will receive priority, in collaboration with NARS. IRRI's role will be to organize training of trainers and to develop training modules and materials.

IRRI PROGRAMS

The Institute has a comparative advantage in incorporating women's concerns into technology development, training, and applied research procedures, by virtue of its symbiotic links with NARS and its global collaborative research networks.

Technologies already developed at IRRI are relevant to the traditional occupations and skills of women employed in production and postharvest operations. They do need to be adapted to the specific, physical, biotic, and socioeconomic conditions of different countries or regions within countries. The opportunities available were cataloged in a lecture by M. S. Swaminathan in 1982 (Appendix IV).

Seed Production

Estimates of yield reduction attributable to poor seed range from 12 to 20%. Seed selection, multiplication, and distribution normally are handled on a farmer-to-farmer basis rather than through certified seed programs. But rice varieties, particularly newer ones, may not be locally available or may be too expensive, of poor quality, or contain mixtures. Seed storage and preservation are normally women's responsibilities; women's skills and labor can determine seed quality. There appears to be considerable scope for improving seed viability through better management and storage. Women can be trained in the proper techniques of seed selection, production, management, and preservation.

An experiment on seed production and management involving women is being conducted in Guimba, Nueva Ecija, Philippines, in collaboration with IRRI's Multiple Cropping Department. Women's skills in the proper care and management of seeds (from crop establishment to postharvest) can reduce yield losses and provide better understanding of seed technology problems. This research will be extended within the IRTP Network.

Integrated Pest Management (IPM)

A number of their farming activities qualify women for important roles in IPM. Women often select, buy, and store seed; purchase chemicals; monitor pests and diseases while weeding; and take part in decisions on crop rotations that break pest and disease buildups. Women can be trained to improve their monitoring techniques, pest management practices, and biological pesticide application. The training needed is in sampling and identifying pests and diseases, and in recognizing buildup patterns and the types of damage inflicted. Women can be trained to diagnose common diseases during weeding. Women can be taught to use neem and other botanical products for pest control in the fields and during storage. Biological pest control is particularly important for mungbean and other grain legumes after rice in rainfed areas.

A prototype IPM field project "Enhancing the Productivity Roles of Women in Rice Farming Systems Research and Extension" is underway in Calamba, Laguna, Philippines. The project is being conducted by a multidisciplinary team of women from IRRI and the University of the Philippines under the auspices of the WIRFS program. Activities include: IPM technology generation and verification, with a socioeconomic component; audio cassette communication support to the publication A Farmer's primer on growing rice; and training nontraditional extension audiences (women and out-of-school youth in villages).

Postharvest Technology

Although excellent work is being done by several agricultural engineering programs in Asia, relatively little attention has been given to the role of women in postharvest activities. Low-cost technologies that use local materials, are energy efficient, and are easy to manufacture are needed for on-farm crop drying, winnowing, parboiling, husking, storage, and processing.

Food Processing

Parboiling glutinous rice is a home industry traditionally performed by women in the Central Philippines. A dehuller and a rotary dryer for parboiled glutinous rice have been developed by IRRI. The manually operated dehuller has a wooden roller with a hard rubber surface. It can be adjusted to process peanut, soybean, and

mungbean. The rotary dryer substantially reduces the drudgery of drying parboiled glutinous rice. It also can be used to process cassava flour.

Biomass Utilization. Women already use rice straw, bran, and hulls for a variety of purposes. Technologies now being developed could improve the quality of current products and the use of expanded biomass. Some examples of potential farm-level technologies include rice straw and hulls.

Rice straw as a substrate for mushroom production is a new income-generating activity, particularly during the dry season, for farm and landless women. Making paper from rice straw is being evaluated as a small-scale, household enterprise. Papermaking could be an important source of income for rural women in areas where rice straw is traditionally burned.

With increasing scarcity of cooking fuel, rural households are resorting to using on-farm sources of energy, such as rice hulls, cow, dung, and corn cobs. Charcoal manufactured from partially carbonized rice husks produces a low cost, clean-burning fuel, suitable for household use, that is easy to store.

Agricultural Machinery

A number of machines are now available to increase labor efficiency, lower costs, and reduce drudgery. However, these devices were designed primarily to meet the ergonomic needs of male farmers. But many physically stressful and time-consuming agricultural tasks are performed by women. Machines designed more specifically to reduce the drudgery and time required for women's tasks need to be developed.

A current mechanical initiative that addresses these objectives is the "tapak-tapak" pump, a treadle-powered, medium-lift irrigation pump which can be easily operated by women. This low-cost technology may provide opportunities for dry season vegetable cultivation following rice. Other agricultural implements and machinery can be tested for their adaptability in other countries.

In addition to stimulating explicit attention to women's needs in agricultural engineering research, IRRI will foster the rapid exchange among NARS of already available tools and implements. For example, several useful farm implements available in China for women-specific occupations could be easily adapted and popularized in other countries. IRRI recently entered into an agreement with the Chinese Academy of Agricultural Mechanization Sciences (CAAMS) to achieve this. (Appendix IV).

Socioeconomic Research

The effects of technology on production systems and social structure have important consequences for women's roles and welfare within the farm household, the

community, and society. Rigorous analysis of the effects of modern rice technology on the household, and on women in particular, is important in evaluating the welfare implications and appropriateness of technologies to users. The following studies are being conducted at IRRI:

1. Differential Impact of Technical Change on Favorable and Unfavorable Areas. The study, under the leadership of Dr. Cristina C. David, includes a systematic analysis of the impact of technical change on production, consumption, and labor supply of men, women, and children in farming and landless households. Data are being collected in Thailand, Bangladesh, the Philippines, Indonesia, and Nepal.

2. Farming Systems, Households, and Women in an Upland Environment: Claveria, Mindanao, Philippines. The project, being conducted by Zenaida Kenmore, a Ph D student in anthropology, is examining cultural, social, religious, and political factors affecting the decision-making behavior of rural households in regard to agricultural and postproduction activities. The aim is to identify innovations in cropping technology that benefit women and to characterize the adaptive strategies employed by family members.

3. Household and Individual Decision-making in a Rice-Aquaculture System. The study is of a village where a small-scale rice-fish system was recently introduced. The research documents intrahousehold decision patterns and processes with respect to changing resource use induced by the new technology for different categories of farmers. The effects of social stratification and gender on defining opportunities, constraints, and perceptions are being examined.

4. Understanding the Household in Crop-Livestock Farming Systems: Santa Barbara, Pangasinan, Philippines. This analysis of intrahousehold allocation of resources (land, labor, cash), gender differences in access to and control of productive resources, decision-making, and the effects of technologies on farming and landless families is being done in conjunction with research on introducing technologies for women (See Appendix II).

Training and Technology Transfer

WIRFS activities will be integrated into the training activities of the Prosperity Through Rice Farming project (funded by the Asian Development Bank, ADB) as well as other IRRI programs such as the Rice Production Training Program, Cropping Systems Training Program (CSTP), Farming Systems Socio-Economics Research, Varietal Testing, Rice Farming Systems, IPM, Agricultural Engineering, Genetic Evaluation and Utilization, IRTP, and INSFASURF. Efforts will be made to expand female participation in all of these programs.

Twenty women cooperators from the WIRFS project in Santa Barbara, Pangasinan, Philippines, have been trained in mushroom production at IRRI through the Prosperity Through Rice project.

A training module on WIRFS is being developed for the CSTP.

The technical knowledge of women involved in rice farming could be enhanced by providing access to publications dealing with rice and nonrice crops. Research by IRRI's Communication and Publications Department shows that the monograph A farmer's primer on growing rice was read with equal comprehension by women and men. Future publications, such as Farmer's primer on growing cowpea, will target female as well as male farmers.

Networks

During the last decade, IRRI has established networks linking researchers in a number of countries, providing mechanisms for coordinated, focused research on priority problems. The major networks include the ARFSN, IRTP, and INSFASURF. These networks have been crucial in the development, evaluation, and extension of improved technologies, methods, and germplasm for rice-based agriculture. The WIRFS program will be integrated into selected activities in each of these networks.

ARFSN. ARFSN, established in collaboration with national agricultural programs in Asia, involves national scientists working with IRRI to increase food production by identifying appropriate rice-based farming systems. The network now involves 15 countries; the number of rice-based cropping/farming systems research sites has increased from 6 in 3 countries in 1975 to 236 in 15 countries in 1986. The farming systems methodology used in the ARFSN, first formulated in 1975, has been continuously refined. WIRFS activities will be integrated into this network through targeted activities at key sites in selected countries.

INSFASURF. The role of women in biofertilizer production and utilization will be emphasized. Maintaining Azolla inoculum throughout the year and applying Azolla to the field could be an aspect where women can be involved. Seed production and storage of green manure crops such as sesbania rostrata also are important activities in which women can be involved. Seed storage of leguminous green manure crops is critical because viability declines rapidly.

INSFASURF also will assist in training women in biofertilizer production and utilization. It has committed \$10,000 of its proposed budget for this activity, particularly for preparing training materials and for training women. IRRI's Training and Technology Transfer Department (TTTD) will collaborate with this network. Ten percent of the network coordinator's time and 10% each of the two training assistants time, will be committed to this activity.

IRTP. IRTP will give explicit attention to training women in seed technology. Women in rice farming communities can play a key role in enhancing rice crop productivity by ensuring that seed has high germination and vigor, physical and genetic purity, and freedom from pathogens. IRTP proposes to commit \$25,000 to training women in seed technology programs; the network coordinator has committed 20% of his time and 20% of a postdoctoral fellow's time for WIRFS seed technology research.

PROPOSED PROGRAMS

One feature of the WIRFS program that distinguishes it from other Women in Development programs is the integration and institutionalization of women's concerns into research programs dealing with the improvement of productivity, profitability, stability, and sustainability of rice-based farming systems. The WIRFS program requires not only technical intervention, but also substantial changes in perceptions, attitudes, values, roles, knowledge, skills, frames of reference, and social relationships. Changes in national and international actions are needed, not only at the farm and household level and in public policymaking, but more importantly in agricultural research and extension systems. Institutional changes do not occur quickly. But given a firm commitment of adequate intellectual and financial resources and dedicated leadership, it should be possible to achieve substantial improvements in the lives of rural women in the near future.

Seminars and Conferences

IRRI, in collaboration with NARS, will organize seminars, monitoring tours, and conferences to review the state-of-the-art in specific areas of interest to the WIRFS project and to develop work plans for further collaborative research. Two seminars are planned for 1987-88.

- o The Indian Council of Agricultural Research (ICAR)-IRRI Conference on "Appropriate Agricultural Technologies for Farm Women - Research Strategies and Linkages with Development Systems" in New Delhi, 11-15 December 1987. The Prime Minister of India has agreed to inaugurate this conference.

- o The CAAMS-IRRI Traveling Seminar cum Workshop on "Farm Implements for Women in Rice Farming Systems" in 1988.

Core Research at IRRI

Steps have been taken to imbed gender issues into IRRI programs. A working group of scientists from IRRI and other institutions in the Philippines provides overall guidance. Commitments are secured from specific departments for research design and testing.

The WIRFS Advisory Committee will continue to guide the program. The Advisory Committee consists of the IRRI Director General as Chairman, with representatives from four IRRI departments (TTTTD, Agricultural Economics, Entomology, and Agricultural Engineering), ARFSN, IRTP, INSFASURF, UPLB, the Regional Network for Agricultural Machinery, ADB, and the United States Agency for International Development (USAID).

Women's participation in Sesbania seed production and management, Santa Barbara, Philippines, Crop-livestock project.

International Rice Testing Program

Women's participation in all aspects of seed technology.

INSFASURF

Involvement of women in the production and application of Azolla, blue-green algae, and green manure crops.

OPERATIONAL RESEARCH PROJECTS

Six countries (Bangladesh, India, Indonesia, Nepal, the Philippines, and Thailand) are now part of the network. Technologies and mechanisms for incorporating WIRFS issues into farming systems research will be developed at several key ARFSN sites. Application of the methodologies, implementation, and results from research at these key sites in their own WIRFS research activities will be discussed with NARS. It is generally agreed that WIRFS activities in individual countries should be funded by national agencies or by suitable bilateral donors. Initially, however, seed funds are needed to establish the credibility and importance of national program activities.

The ARFSN sites identified to develop technologies and mechanisms incorporating WIRFS issues into farming systems research follow.

Philippines

- a. Santa Barbara, Pangasinan. Continue work at the Crop-Livestock farming systems site in collaboration with the Department of Agriculture, (DA), UPLB, and the Institute of Animal Science (IAS) in both rainfed and irrigated rice farming. Funding, initially by IRRI, later by the Philippine National Rice Research Institute, (PhilRice).
- b. Guimba, Nueva Ecija (rainfed lowland site). Coordinate activities with an agronomist from the Farming Systems Department: begin to involve women in seed production and management; include women in economic analysis. IRRI funding.
- c. Claveria, Misamis Oriental. Assess women's roles in an upland acid soil environment and introduce specific technologies for women, particularly labor-saving technologies. IRRI funding.

d. Trece Martires, Cavite. Begin operational research at a Crop-Livestock research site (upland rice farming systems) in collaboration with the Farming Systems and Soil Resources Institute, IAS, and DA and IRRI funding.

e. Department of Agriculture and Food, Regional Integrated Agricultural Research stations (RIARS) stations. Include the role of women and household members in data collected. Encourage consideration of women's concerns in technology verification and dissemination. DA funding.

Thailand

a. Amphoe Phrao, Chiang Mai (irrigated and rainfed sites). Activities implemented with Chiang Mai University and Farming Systems Research Institute. IRRI funding (\$5,000 to initiate work).

b. Ban Phai, Khon Kaen (rainfed lowland site). Research in cooperation with Farming Systems Research Institute, Division of Agricultural Economics, Livestock Production Department, and Khon Kaen University. International Development Research Centre (IDRC) funding being requested.

Nepal

a. Pumdi Bhumdi (rainfed lowland and midhill). Explore crop-livestock research sites in collaboration with the National Department of Agriculture, Department of Livestock Production, and Winrock International.

b. Ratna Nager (irrigated, partially irrigated, and upland). Farming Systems research in the inner terai in collaboration with the National Department of Agriculture and Winrock International. USAID funding (Agricultural Research and Production project).

c. Agricultural Projects Services Center has submitted a proposal to evaluate the participation of women in rice farming systems in Nepal. IRRI will assist in identifying interested donors.

Indonesia

a. Baturmatra - upland and soils crop livestock research in collaboration with the Bogor Research Institute for Food Crops (BORIF) and Bogor Agricultural University. IDRC funding being requested.

b. Sukamandi - irrigated rice farming systems focusing on rice-fish. Activities begin in 1987 in collaboration with Maros Research Institute for Food Crops (MARIF), Bogor Agricultural University, and International Center for Living Aquatic Resource Management (ICLARM).

c. Salatiga - hillside upland farming systems with upland rice-livestock system managed by Upland Agriculture and Conservation project Central Research Institute for Food Crops (CRIFC) and Bogor Agricultural University. Upland Agriculture and Conservation Project funding.

The current project has provided Dr. Sajogyo, Center of Development Studies, Bogor Agricultural University, US\$5000 to assist economist in the farming systems sites and to fund other sociologists' participation in analysis of the disaggregated gender data which are available.

Bangladesh

a. Incorporate WIRFS activities into work at 1-2 rainfed lowland cropping systems sites, in collaboration with Bangladesh Agricultural Research Institute and Bangladesh Agricultural Research Council.

b. Trisail - rainfed lowland farming systems site (crop-livestock and rice-fish farming), in collaboration with Bangladesh Agricultural University (BAU).

c. Propose inclusion in ADB-funded Phase II Prosperity Through Rice Project to consider role of Bangladesh women in postharvest processing and biomass utilization. Alternative is to assist BAU and collaborating institutions to find funding for this project.

India

Programs will be finalized after the ICAR-IRRI conference scheduled in December 1987.

OTHER COLLABORATIVE RESEARCH

Child care support systems WIRFS is collaborating with the Social Development Index (NGO based in Quezon City, Philippines) to examine systems of child care used by working mothers. This research will help quantify the need for rural-based day-care centers and other child care support systems. Case studies are being conducted in Santa Barbara, Pangasinan.

UPLB. IRRI will continue to provide funding and to coordinate Philippine components of WIRFS until PhilRice is prepared to take the responsibility. The WIRFS Philippine component is under the leadership of Dr. Agnes Rola, an agricultural economist attached to the Center for Policy and Development Studies (CPDS) at UPLB.

PhilRice. IRRI will work with PhilRice in collaborative research on women in rice farming in the Philippines and on the integration of women's concerns into

the activities of the RIARS. The work of PhilRice is just beginning, it will be coordinated with CPDS and other agencies.

TRAINING

Short-term training for researchers directly involved in WIRFS at ARFSN sites will be organized. Special course materials and methodologies to integrate women's concerns into farming systems research will be developed. Postdoctoral fellows and graduate students interested in thesis research on women's issues will be supported by WIRFS.

WORKSHOPS, MEETINGS, AND MONITORING TOURS

Workshops at periodic intervals will review progress, consolidate case studies and research findings, and modify or adjust methods to ensure maximum impact. The initial workshop will also involve a training component, in cooperation with the Population Council and the Farming Systems Support Project (FSSP-University of Florida).

A 1987 review and project monitoring tour in Thailand will involve key scientists conducting WIRFS research from each participating country.

IRRI and UPLB researchers directly involved in the WIRFS project and four collaborating researchers from Thailand, Indonesia, and Bangladesh will present papers at the December 1987 New Delhi conference on Women in Agricultural Development jointly sponsored by ICAR and IRRI. The Prime Minister of India has agreed to inaugurate the conference. M. S. Swaminathan has been invited to give the keynote address. Thelma Paris and Bart Duff will develop a position paper describing the methodology to identify, evaluate, introduce, and institutionalize new technologies of benefit to women in rice-based farming systems. The theme of the workshop is "Appropriate Agricultural Technologies for Farm Women Research Strategies and Linkages with Development Systems." Travel expenses for selected participants will be funded from grants from the Ford Foundation, the United Nations Development Programme, and other donors.

WIRFS will provide regional and core funding for a training workshop and/or develop teaching case studies from South and Southeast Asia. The objective is to increase inclusion of gender as an analytical tool for on-farm research. This activity will be a joint effort with the Population Council/Farming Systems Support Project (FSSP) Case Studies Project. The FSSP Project will provide funding for trainers and for developing workshop materials.

In 1988, IRRI and CAAMS will organize a traveling seminar cum workshop in China on Farm Implements for Women in Rice Farming Systems. The workshop will involve visits to sites in China where useful farm machinery has been developed for women-specific activities, followed by a review of the current status of farm

machinery design and development activities targeted to the needs of farm women and women in rice farming areas. The aim is to focus attention on agricultural machinery that can enhance productivity, reduce drudgery, and generate diversified opportunities for income and employment through multiple cropping, mixed farming, and improved postharvest technology.

RESULTS EXPECTED

The WIRFS program is designed to identify economically viable and socially acceptable opportunities for improving the productivity and livelihood of rural women. We expect results to include:

1. documentation of the roles and activities and women in rural households, including their participation in decision-making processes;
2. a list of activities where the introduction of improved and/or new technology has the potential to increase the productivity of women's labor and income;
3. identification, design and/or development, and transfer of technology particularly suited to the needs of women;
4. development of methodologies to identify and introduce viable technology to rural women;
5. institutionalization of women's concerns within IRRI's core research and development programs and within IRRI-NARS collaborative and development programs;
6. a critical mass of workers trained in techniques and mechanisms for identifying and introducing viable WIRFS projects.

Achieving these results is clearly an ongoing, long-term process. However, it is anticipated that a set of methodologies will be developed and prototype projects in individual countries begun within the first three years. It is also anticipated that training activities will be developed in collaboration with other agencies and that a viable network for the exchange of information and ideas will be in place.

REPORTING PROCEDURES

It is proposed that the WIRFS program develop a format for reporting project activities every six months. Semiannual progress reports will ensure that an up-to-date, contemporary record of all project activities is available and provide a historical archive. In addition, regular reporting will provide the basis for measuring progress and an accountability framework for assessing program productivity.

Copies of the semi-annual report will be distributed to donors, members of the WIRFS research network, and other interested individuals and agencies.

Appendix I

WOMEN IN RICE FARMING SYSTEMS RESEARCH/ACTION RESEARCH PROGRAM: AN INTERIM REPORT

The purpose of this report is to review activities and progress vis-a-vis the Perspective Plan for Research which was developed in October, 1986. In order to relate this report to the plan, we reiterate here the latter's significant features:

"Conclusion Number 10 in the Summary of International Agricultural Research Centers: A Study of Achievements and Potential (popularly known as the CG Impact Study says:

'The Center's emphasis on the human aspects of technological advances has grown as interest in farming systems research has spread. Nonetheless important areas such as the problems of female farmers in male dominated societies and the limited presence of women in research organizations have hardly been touched.'

Here one cannot help but be touched by the encouraging implication that the "problems of female farmers ..." is perceived as one human aspect of technological advancement. In their analysis of Who Benefits from the New Technology, Barker, Herdt and Rose conclude that:

"Technology is a tool to meet society's needs, its use must be determined by society acting in its own interest."

Since research institutions are social creations, they are very much part of that society which determines the uses of technology they help produce. Whose interests do they have in mind in the creative process?

And what does this mean to a research center which "has established an enviable record of achievement and a reputation for the excellence and relevance of its scientific and manpower development programs?" If we take two IRRI maxims: Rigor and Relevance, rigor is what makes science scientific but it is relevance which makes it humane. In many societies the lot of farm women is far from being humane. How can the rigor of science be even more responsive to what is relevant and humane for women in rice farming systems?

There are at least four roles which IRRI can usefully play perhaps with changing emphasis as the research/action research program gets underway and new problem areas emerge:

a) Leader role

Ideas, like germplasms, are a potent force for stimulating change and organizing means to translate them into achievable goals. Defining farmer to mean male or female and finding connections between farm and household are not established habits of thought whether in international or national research and extension systems. And

this is not always a male bias either. IRRI and the CG system in general can serve as a role model in this regard without waiting for the next generation of scientists.

b) Technical role

This role can be exercised in two ways:

- through its knowledge base; and
- through its concrete technologies.

Most analyses of the green revolution impact focus on growth, equity, and employment but hardly anyone mentions that technological changes have ushered in a new era of science-based agriculture in a way which has led farmers to novel ways of thinking about and managing the farm. It might have been a green revolution in farmers' fields often with a checkered performance but much more positive, profound, and lasting in its significance is the "science intrusion" into farmers' heads which in creative combination with old practices and accumulated wisdom enable them to apply the new technology.

Unfortunately, in this "science intrusion", modernization, and change-orientation, farm women have not really participated because they have not been defined as farmers. IRRI's continuing stream of technologies are very fertile sources of relevant ingredients for "science intrusion".

c) Catalytic or facilitative role

The Impact Study concluded that "the centers have provided a vehicle for transferring innovations based on crop germplasm from country to country along with the knowledge of how to adapt such innovations to local conditions and how to achieve further advances". An analogous role can be played with respect to experiences in WIRFS projects. IRRI can be a vehicle for transfers of promising ideas from country to country.

d) Training role

Because women have not had as much opportunity for agricultural research and training as men, a special search for female participants in IRRI's many training programs can be made. Sensitization of trainees at all levels to women's technology and training needs can be built into these programs.

Perhaps in some instances, special preparations will be needed in their home countries to qualify them for the training. Or perhaps special training programs can be designed in cooperation with national programs. We do not believe in "for women only" activities except for women in seclusion or for strategic reasons when women need to build enough confidence to interact with men on a less than unequal basis.

The Research/Action Research Program has defined its objectives as follows:

- a) to develop mechanisms by which women's roles and needs (as participants, users, and beneficiaries) will be considered at appropriate stages of technology development and dissemination;

- b) to find out whether and to what extent this consideration will increase the efficiency and effectiveness of the agricultural research and extension process; and
- c) to examine whether and to what extent this process promotes women's interests and contributes to the positive effects of technical change on their welfare and that of the entire household.

Five general areas of research/action research will be promoted:

- a) Women and Technology Development - the major, though not the exclusive thrust is to integrate the concept of women's various roles within the farm and the household into farming systems research. The basic elements for achieving this are:

- analysis of women's productive activities within the farming system including their roles in the household and in the management of agricultural production;
- identification of existing, emerging, and possible technology options conducive to the expansion of women's productive capacity as well as human development potential;
- greater understanding of the factors constraining or supportive of women's more productive participation in farming system such as access to information, organization, productive resources, access to and control over the fruits of production;
- application of this understanding throughout the farming systems research process; and
- pilot testing of promising technologies.

Because we view technology development as an interactive process with users, promising technologies such as integrated pest management, integrated nutrient supply management, post-harvest processing, crop-livestock technologies, and food legumes, other crops, etc. will be introduced on a pilot scale in suitable villages. The intention is not just to introduce new potentials into the existing farming systems but to further develop these technologies on the basis of farmers' and women's evaluation of these innovations. Pilot testing is meant to involve the agricultural household in technology development. Hopefully, the process will improve the "goodness of fit" between the technology, the farming system, including the needs of women and the welfare of the household. This "experimental" process will likewise provide us a dynamic rather than static analysis of how women's roles can be realistically taken into account in technology development.

- b) Women and Extension - Despite women's significant roles in rice farming systems, extension programs tend to transfer agricultural technology information to men and focus on home technologies for women. In the process, only male farmers are linked to research scientists ignoring the important knowledge, experience, and needs of women that need to be incorporated in technology development. Activities in this area will include analysis of missed opportunities caused by

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male-oriented approaches and action research to determine appropriate ways to reach women or to include them in extension programs.

- c) Impact of New Technologies on Women and the Household - At the macro level, the adoption of new technology can affect women in several spheres: for example, in increasing or decreasing opportunities for employment; altering nature of employment and demand for different skills; in changing the location of employment (in the home, on the farm or off-farm); in altering patterns of migration and thereby household structure, and so on.

At the intra-household level, impact would be reflected in household strategies; pattern of use of women's time and its effect on other members of the household, namely children; performance of household chores and sex role division within the household; on nutrition and health of adults and children, etc.

Analysis of impact will include consideration of various other factors - socio-cultural, institutional, and economic. These studies will not only be essential in evaluating appropriateness of new technologies but will also contribute to our understanding of the relative importance of technology compared to other factors such as: access to resources and government policies which promote women's interests, etc.

- d) Complementary Studies - Just as component technology research is done in the experiment station to support farming systems research, this program will promote complementary studies, for example, on the dynamics of agricultural household behavior; the functioning of rural labor markets; the policy environment which affects farm and household decisions; typologies of farming systems and agricultural household in different ecological and socio-economic settings, etc. The aim will be to provide us a more comprehensive understanding of what other happenings impinge on the farming system. Typologies can help us organize the multitude of variables which confront us in a more persimonious manner analogous to agro-climatic zones of the biological scientists.
- e) Sensitization Programs - Because of the lack of recognition that the agricultural household is not a homogenous unit; that women in many Asian countries are a disadvantaged group; and that women are major participants in rice farming systems, their roles and problems have been generally ignored in technology development and dissemination. Using relevant experience, data, and analysis generated from projects of this network and elsewhere, various types of sensitization programs will be designed to reach agricultural scientist, policy makers, development administrators, farmers, and women themselves.

The Approach

IRRI proposes to organize a collaborative and coordinated effort to undertake research/action research in the general areas mentioned above under the overall umbrella of the Asian Rice Farming Systems Network.

The attainment of this program's objectives is the task of both biological scientists, social scientists and policymakers. Institutionalization of women's concerns within the agricultural research and extension system dealing with rice

farming systems is the ultimate aim. The network approach where parallel efforts toward the same goal are being undertaken in IRRI and among national research systems will ensure that each country's program benefits from the intercountry interaction as well as take immediate consideration of country-specific differences in socio-economic and cultural circumstances." There are six countries included in this program: India, Bangladesh, Nepal, Thailand, Indonesia, and the Philippines.

IRRI AND WOMEN IN RICE FARMING SYSTEMS

As early as 1979, data on the role of women in rice farming systems had been deliberately gathered through the research project on "The Consequences of Small Rice Farm Mechanization in the Philippines, Indonesia, and Thailand" under the leadership of Bart Duff. The study was concerned, among other things, about the impact of mechanization on family as well as hired labor whether male, female adults or children. Perhaps it is fair to say that findings from this study provided some of the early awareness about the subject. Researches done by Lyda Res (1979-1982) and Pauline Ticheler of Wageningen (1985) with the support of and/or collaboration with IRRI contributed further to this initial sensitization. The former did a study on Households, Women, Labor and Change in a Philippine Refined Rice Village in Iloilo. The latter did a comparative study on the role of women in two villages (isolated and non-isolated) also in Iloilo.

But the 1983 Conference on Women in Rice was IRRI's major initiation into women's issues. Following Dr. Jennie Dey's consultancy in 1984 and her visits to several institutions in 6 countries - India, Nepal, Bangladesh, Thailand, Indonesia and the Philippines, a Project Design Workshop on WIRFS was held in April 1985.

Since then, the following have taken place at IRRI and IRRI-related programs:

- 1) Specific WIRFS project development activities in the Philippines started about August 1985 under the leadership of Dr. Cristina C. David, Department of Agricultural Economics. Three field trips were organized to cropping/farming systems sites in Central Luzon and Laguna including researchers from UPLB, Institute of Philippine Culture, and two IRRI scientists. On September 30, very

preliminary project ideas were discussed in an informal meeting of social and agricultural scientists who have been involved or are interested in research or action programs related to women; the coordinator of the Asian Rice Farming Systems Network; two IRRI scientists; representatives from USAID, ADB and PCARRD; the Executive Director of PBSP (an NGO); the Assistant Minister of Agriculture and Food and a representative from the Bureau of Agricultural Extension. Each participant was asked to present her activities relevant to WIRFS. In addition to this workshop, a number of small group meetings were held. IRRI supported all these initial project development activities.

- 2) Dr. James A. Litsinger and his staff introduced IPM concepts to the Philippine component of WIRFS. We now have a very dynamic UPLB interdisciplinary research team composed of 5 female scientists:

Dr. Candida Adalla	-	Entomologist
Dr. Agnes Rola	-	Economist
Dr. Teresa Stuart	-	Development Communication
Dr. Blanda Sumayao	-	Agricultural Extension
Dr. Melanda Hoque	-	Vertebrate Pest Control

A field project is currently underway in three villages of Calamba, Laguna: Looc; San Juan and San Jose. The project which aims to verify and generate location-specific thresholds of pests in rice covers a total of 34 hectares with 22 farmer cooperators. All five researchers go to the site every week and they have two female research assistants who visit the field plots everyday to monitor insects and pests. Farmers manage the IPM plots as well as their own. In a recently concluded Field Day, preliminary assessment of yield data shows no significant difference between IPM and farmers' plots. The latter sprayed more often. The economics of the two treatments will be determined and results of the analysis fed back to farmers and their wives. The Field Day was made a Mr. and Mrs. affair.



From observations in farmers' meetings it was evident that although Calamba is very close to UPLB and IRRI, a number of very basic concepts in rice production are not well-understood; e.g., the significance of nitrogen content of fertilizers; specific identity of varieties in use or newly obtained is not accurately known and therefore varietal characteristics are quite confused and the message about varietal resistance does not always relate to the seeds being planted. Clearly the concept of economic threshold level in IPM is counter-intuitive and contrary to what they had been taught before about calendar spraying and spraying at the first sign of insects.

As one of the farmers remarked: "Even if we count and count, if we do not spray, nothing will happen". Spraying is their "security blanket". But the more disturbing practice is the spraying of vegetables with potent insecticides even just before harvesting. Many rice farming households also grow vegetables as cash crops and women are very much involved in this task.

The researchers have decided to include vegetables in their IPM thrust and Dr. Peter Kenmore of the FAO Regional Integrated Pest Control who is supporting the project has agreed to the inclusion of vegetables in the next cropping season. Additional funds will be provided for the purpose.

Dr. Blanda R. Sumayao has started an accompanying activity in terms of training non-traditional audiences (e.g., women and youth) on the IPM technology necessary to undertake IPM-related decisions. She is also thinking of organizing a cadre of youth trained as pest monitoring teams who could be tapped by farmers for pest monitoring activities.

From interviews and field observations, the IPM project found that wives perform supervisory and field monitoring functions particularly when their husbands are away on other jobs. Awareness of and knowledge about IPM would provide more relevant insights on what to supervise and monitor in their farms.

3) Dr. Teresa Stuart of the Department of Development Communication in cooperation with DEVCOM staff and students, DZLB staff, extension technicians of two municipalities, the Regional Crop Protection Officer and Dr. James Litsinger piloted a school on the air (SOA) on integrated pest management over radio station DZLB. The objective was to determine the effectiveness of this radio format as a communication support to the diffusion and adoption of IPM technology among men and women rice farmers. The study focused on a comparison of the performance of women farmers with that of men to ascertain their potential as participants in IPM technology diffusion.

Of the 103 initial enrollees, 60 graduated from the eight-week radio course. The participants consisting of 21 women and 39 men came from villages in Bay and Calauan, Laguna. Twelve radio lessons were developed and the SOA program was aired every Monday, Wednesday and Friday from 7:00-7:30 P.M. from January 6 to March 7, 1986. The manual on School on the Air for IPM was prepared and printed in time for the graduation and distribution of certificates.

Findings indicate that school on the air can be an effective communication support to the diffusion and adoption of IPM technology. Both female and male participants showed significant knowledge gains from the course content as evidenced by the differences between pre-test and post-test scores. Furthermore, the female participants performed as well as the males in the pre-test, quizzes and knowledge gain. Women have shown that they can equally tackle even the more technical agricultural information like IPM which is ordinarily perceived to be the male farmer's cognitive and physical domain. The results suggest that women are as capable as men in understanding a relatively complicated topic in rice production such as IPM, a subject that is outside the realm of homemaking, health, nutrition, food preparation and child care.

- 4) The Crop-Livestock Project in Sta. Barbara, Pangasinan which is part of the Asian Farming Systems Network is undertaking an actual "on-the-ground" integration of women considerations in crop-livestock production through the active leadership of Ms. Thelma R. Paris, from the IRRI Department of Agricultural Economics. After a relatively simple analysis of women's roles in the different crop and livestock activities in two villages (which in many ways has contributed to the "emergence" of a "crop-livestock system" instead of a crop-livestock separation), women have now been included in farmers' classes, whatever the subject matter might be: livestock, legumes, rice production, crop residues, etc. Women who are involved in feeding livestock were also taught how to store rice straw, crop residues, etc. A farmers' association has been organized with women members as well as officers.

Because the role analysis revealed that women derive income from the sale and processing of a special glutinous rice product, the agronomist suggested the introduction of IR-65, a short-maturing variety which was tried by 26 cooperators to meet the peak demand for the product before November 1 which is All Saints Day. Their experience with respect to yield, eating quality, and short-maturity has been most positive, hence the demand for IR-65 seeds has expanded even to nearby villages.

The Agricultural Engineering Department (through Dr. Y.W. Jeon, Ms. L. Halos and Mr. L. Bautista), has developed after a series of visits and discussions with women and men in the village, two pieces of simply-designed equipment for the processing of glutinous rice: a very small dehuller which could reduce labor in hand-pounding; and a wood and bamboo paddle for turning the unhulled rice while it is being processed in a galvanized iron pan heated by a furnace. Another gadget which has been developed is the wood and bamboo stick for threshing mungbean, soybean, etc. All of these equipments are non-motorized. Preliminary

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testing of these equipment will be done at IRRI before taking them to the village. The designs are simple; materials are easily available and if found acceptable and workable can be fabricated by the farmers themselves.

The processing of glutinous rice which is an important source of income for the women takes so much time, physical energy and fuel. We hope the newly-designed equipment will enable them to process more rice with less energy. A number of landless women are involved in this task.

Twenty women were brought to IRRI on September 22-24, 1986 for hands-on training in mushroom culture using rice straw as substrate. They also visited the Institute of Plant Breeding to look into vegetable production and the PBSP Center for Rural Technology Development in Calauan, Laguna for small farm agricultural technology applications. Different vegetable seeds such as okra, bush beans, cucumber, tomatoes, eggplants, etc. from the Institute of Plant Breeding have been introduced to the women since they are very much responsible for vegetable production whether for cash or for home consumption.

The women who have been trained in mushroom culture are now in the process of trying on their own what they have learned. They have succeeded in the culture and production of spawn and they are presently gathering rice straw for the substrate. Earlier, they have produced some small amounts of mushrooms for home tasting. Their families enjoyed the product and look forward to eating more. Perhaps it is fair to say that when these women start producing mushrooms, it will be the first farm-level application of technology demonstrated at IRRI through the Prosperity Through Rice Project. The production time comes after rice harvest.

But equally important from our point of view is the intellectual excitement associated with having learned something new and different. For these women, the trip and the training is something they will talk about for a long time. We

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believe that what takes place in their minds is just as enriching as what they are able to sell.

A family which has 13 children asked that they be taught mushroom culture since the wife was unable to join the group that went to IRRI. When we visited them, the mother said her children were very much involved in the different steps of mushroom culture. They eagerly await the outcome of what they have "planted" in the rice straw. Here is one household where mushrooms have a tremendous potential as food for 13 children plus another one on the way!

In the same research site, Dr. Priscila Juliano of UPLB studies farmer response to new technologies such as feeding of *Leucaena* to cattle, mungbean, etc. Women have always fed *Leucaena* to swine but men were resistant to its use for cattle. In the case of mungbean which was planted more extensively in 1985, wives were the main decision-makers on when to sell their crop and at what price. They go to market to canvass prices and market the crop themselves.

IRRI research assistants on-site monitor prices and will share with the women the price trends so that they will be able to take advantage of better prices.

A Field Day is planned next month where products, processes, equipment, can be demonstrated and more things learned.

By late 1986, the Communication and Publications Department (CPD) of IRRI had produced almost 230,000 copies of the Farmer's Primer on Growing Rice with 36 editions printed in 30 languages. According to CPD, translators and co-publishers of the book in 9 Asian countries considered farmers and extension workers as the main users of IRRI's most widely co-published books, the Primer and the Field Problems of Tropical Rice (17 languages by 1986).

The Primer is a highly illustrated book that describes the "whys" and "hows" of improved techniques for lowland rice farming. The Primer has minimal text and

uses black and white illustrations with ample white space on every page to allow for text translation. The author and IRRI hoped that one picture-text combination would help farmers better understand the book's messages. Since the Primer is regarded as IRRI's most successful co-publication project, CPD initiated research to determine if translated editions of the Primer are effective in transferring knowledge about improved rice technology to small-scale farmers (Victoria L. Cabanilla and Thomas R. Hargrove, *The Effectiveness of a Farmer's Primer on Growing Rice in Two Philippine Dialects Among Farmers*, IRRI, 1986).

In their study of Primer effectiveness in bringing about knowledge gain among 84 farmers in Cavite and Negros Occidental, only 4 of them were female. Although women were not deliberately recruited for this test, Cabanilla observed that some women read the Primer for their husbands.

With this background and in cooperation with CPD and Dr. Benito S. Vergara, the author, the Primer was introduced in late October 1986 to male and female farmers in 4 villages of San Miguel, Bulacan through the ASEAN Population Project on Women in Development and in Sta. Barbara, Pangasinan through the Crop-Livestock Project.

In Calamba, Laguna, the IPM field research site, the Primer will also be introduced but with some modifications. Dr. Teresa Stuart and colleagues produced audio cassette tapes to accompany the Primer and will try a lecture version; male-male dialogue and male-female dialogue. Results will be compared with "Primer only". We hope even illiterates can participate. Pre-test and post-test measures of knowledge will be taken. The farmers are usually given 45 days to read the Primer before the post-test is given.

Experience in San Miguel, Bulacan has shown the tremendous interest farmers have in reading the Primer. Some women who thought that they have to return the

book started copying the text and illustrations. There was a great deal of excitement in learning and preparing for the "examination".

As soon as the results have been analyzed, aspects least understood and not learned will be explained later on by Dr. B.S. Vergara. Perhaps, some revisions can be made with the cooperation of some farmers.

The introduction of the Primer, we hope, will be a conscious beginning in science communication as against conventional technology transfer. It is an effort to demystify science, to widen the farm household's knowledge base for managerial decisions in an environment which is often resource-poor, location-specific and complex. At the farm level, no matter how much scientific knowledge there is elsewhere, farmers have to make decisions based on what is available to them.

As farming becomes more and more knowledge-intensive, farmers need to learn how to learn and the science community needs to learn how to learn from them as well as how to communicate what they know. The current focus on farmer participation also assumes that learning is not unidirectional; neither is it exclusively male.

The encouraging response to these first ventures means that other materials on IPM, seed management, etc. can also be introduced and the Primer which is available in several languages can be tried with male and female farmers in other countries.

A major research project on the "Differential Impact of Technical Change on Favorable and Unfavorable Areas" under the leadership of Dr. C.C. David addresses such problems as rural labor markets, migration behavior, time allocation of household members from farm as well as landless households, technology adoption, labor arrangements, etc. which affect the welfare of males, females, and children.

L.A. Lanzona's preliminary findings from the project on Time Allocation in Favorable and Unfavorable Areas show that:

- a) Labor markets in rice (Iloilo and Nueva Ecija) are characterized by: Unavailability of jobs even during peak months; and the presence of contracts or wage schemes that prevent the equality of wages and workers' marginal productivity.
- b) The situation in the villages studied point to two basic conditions: the optimal utilization of time and the unavailability of jobs in the rice labor market. In effect, the situation is one where an underemployment equilibrium exists. The condition is due to the presence of an insufficient labor market in rice production.

Women are clearly observed to perform more domestic work than the other production activities. This condition is most valid for landless female farmers since the farm female members can easily engage in other income-earning activities. These women spend a significantly greater amount of time to these household activities especially during periods when demand for work is not high. What is interesting is that in unfavorable areas, the amount of time spent on domestic activities alters significantly during periods when labor demand increases. Female farm household members are able to maintain their time for domestic activities. This is not the case with females in landless households who prefer income-earning activities. The households in favorable areas show a system of time allocation which is more efficient than those found in unfavorable areas. They are more able to attain a higher level of welfare.

Two other studies which have just started at IRRI's Department of Agricultural Economics are:

- a) Household and Individual Decision-Making in a Rice-Aquaculture System (Ms. Virginia N. Sandoval, a faculty member of UPLB, College of Human Ecology who

is currently a doctoral student at the University of Kentucky.) This is being done in a nearby village of Sto. Domingo, Bay where a small-scale rice-fish system has recently developed. The presence of several landless households, the managerial role which women play, and the technologies which are currently being applied are some of the interesting features of the study site. Ms. Sandoval who has a background both in biological and social science brings an ecological perspective. She was given a partial IRRI Fellowship with Ford Foundation providing major support.

- b) Farming Systems, Household, and Women (Ms. Zenaida F. Kenmore is a Ph.D. student in anthropology. She is a senior research assistant in the Department of Agricultural Economics.)

Because this study will be done in Claveria, IRRI's cropping systems research site, we hope the results will not only contribute to a better understanding of how household members function in the existing agricultural production system but will also strengthen the socio-economic component of cropping systems research.

- 8) The Crops and Livestock Systems Research Workshop held in Khon Kaen, Thailand (IRRI plays a network coordinating role through Dr. V.R. Carangal) last July 1986 and was attended by more 100 researchers from Bangladesh, China, India, Indonesia, Nepal, Philippines, Thailand, UNDP/FAO, IRRI, IICA, ACIAR and WINROCK produced a Working Group Report which included the following on The Role of Women:

"The important role of women in farming systems is well recognized. Women not only just perform the household duties thus freeing the men to do farm activities, but most often, certain farm activities are done by women, and in many instances women are the key decision-makers both directly and indirectly. The group agreed that the role of women should be incorporated in farming systems research sites."

It is significant to note that these statements were made by crops and livestock scientists themselves. Considering that during the 12 years of the Asian Farming Systems Network's existence, women have never been mentioned, we regard this as a "breakthrough" particularly among agricultural scientists who in general had been rather conservative on this issue. This network has 15 participating countries and we hope the idea will find its way to all the participants who have their own "spheres of influence" in their respective institutions. The "awareness" is high and "acceptance" is coming along. There is no magic route to this integration. However, in terms of "institutionalizing women's concerns within the agricultural research and extension systems", something substantial has happened.

Dr. V.R. Carangal (the coordinator of the Asian Rice Farming Systems Network [AFSN]) has established a practice of including papers and discussions on women issues in farming systems workshops, monitoring tours, working group meetings, etc. Since these meetings always involve travel and field trips, the participants have an opportunity to interact and actually see women in agriculture.

For the 17th Asian Rice Farming Systems Working Group meeting to be held at IRRI from October 6-11, 1986, five active leaders in WIRFS were invited to present papers on "Alternative Ways of Incorporating Women Concerns in Farming Systems Research Sites"

- a) Dr. C. Prasad, Deputy Director General of ICAR, India
- b) Dr. Pudjiwati Sajogyo, Centre of Development Studies, Bogor Agricultural University, Indonesia
- c) Dr. Benchaphun Shinawatra, Department of Agricultural Economics, Chiangmai University, Thailand

- d) Mrs. Ferdouse Hannan, Deputy Director, Women's Desk, Bangladesh Academy for Rural Development
- e) Ms. Thelma R. Paris, Department of Agricultural Economics, IRRI

All of them are very much involved in research/action research on WIRFS. Ms. Thelma R. Paris of IRRI has presented two papers on "Women in Crop-Livestock Farming Systems" in the Conference held at the University of Florida and Khon Kaen. In both instances her presentations were very well received and had generated quite a bit of discussion. The significant feature of her papers is that she is reporting a real-life illustration of how women concerns are actually being integrated into the farming systems research project. There are many guidelines, theoretical and conceptual frameworks of how women issues could be integrated and there are also many well-known contrived cases but on-the-ground happenings are probably not as prevalent particularly where the work is being done in close collaboration with crop and livestock scientists.

- 9) In the April 1985 Project Design Workshop, Dr. C. Prasad, Deputy Director-General of ICAR prepared a proposal on "Impact of Improved Technologies on Women in Rice-Based Farming Systems and the Emerging Problems and Alternatives in India". He has written to say that the Governing Board of ICAR has approved the budgetary provision of Rs 21.00 lakhs (approximately \$170,000) for a 2-year study on the Impact of Modernization in Agriculture on Women (in general) and on women in rice-based farming systems (in particular). On January 17, 1986, an Inter-Disciplinary Research Group was constituted for developing the design of the study as well as the instruments for data collection. This group has met 4 times.

Side by side, a Special Group has been assigned to review the research which has already been done in relation to women in rice-based farming systems or in agriculture in general. These will be documented and synthesized so that future studies could take advantage of earlier findings.

Once the design and instruments for data collection have been finalized, an All-India Conference of Concerned Scientists who will take part in the study will be held. ICAR intends to involve selected scientists from Agricultural Universities as well as from ICAR Institutes. This opportunity will likewise be utilized to create an awareness among leaders and policy-makers about the importance of the study and the need for continued effort as well as occasional stock-taking.

This All-India Conference will be held early next year. In the meantime, work on the research synthesis and the design of the new study is going on.

- 10) Dr. V.R. Carangal encouraged an IRRI Fellow in the Rice Farming Systems Program, his wife and the Assistant Site Coordinator of the Pumdi Bhumdi farming system site in Nepal to look into women's role in 2 farming systems sites. As a consequence, a paper on Women's Role in the Nepalese Farming Systems: A Comparative Study of a Hill (Pumdi Bumdi) and an Inner Terai (Ratnanagar) Farming Systems Site was completed by DIBYA TIMSINA (who used part of the study for an M.A. Thesis in Political Science at Tribhuvan University); Jagadish TIMSINA and Netra Bahadur Chhetry.

When women respondents were asked how they would feel if the extension worker would be a woman, 65 percent in Ratnanagar said it will be "very good" while 73 percent of the women in Pumdi Bhumdi said "quite good". Sixty percent from Ratnanagar and 86 percent from Pumdi Bhumdi also indicated that they would like to participate in training programs in agriculture. However illiteracy among women is quite high (56 percent and 70 percent) in the two villages so appropriate extension media have to be developed. Although women were very much involved in farm activities in both villages, they were participating more in Pumdi Bhumdi. Vegetable and livestock production were the major responsibilities of women (both as decision-maker as well a labor contributors) although they were also actively participating in rice, wheat, corn and mustard production.

Nepal has started a program for training village level female agricultural assistants which WIRFS should encourage through the AFSRN.

- 11) IRRI's collaborative work with developing countries offers opportunities for integrating women concerns in the technology development, training, research and extension programs. In the cooperative project with China on small rice farm mechanization, two rural household surveys are being planned for North and South China. Bart Duff has indicated IRRI's interest in including a consideration of gender issues in the surveys. The findings could be an input in equipment design, policy formulation, training, and in assessment of consequences.

The Prosperity Through Rice Project (Phase II) considers the role of women in post-harvest activities and biomass utilization.

The socio-economic aspect of the program in Madagascar could look into women's roles in the existing farming systems so that these can be taken into account in component technology development, training and extension. This could also be done in Bhutan.

We have also prepared a proposal for a Participatory Action-Research-Training Project entitled: Bangladesh Rural Women in Rice Post-Harvest Processing and Biomass Utilization. The objectives of this project which has three interactive components; research, action and training are:

- a) To conduct social, economic, and technical analysis of existing traditional practices in post-harvest processing and biomass utilization;
- b) To design, develop, and pilot test alternative or improved technologies in collaboration with rural women who are actually involved in these activities;
- c) To organize and train other action-research teams in the techniques of analysis and procedures for participatory approach to the development of technologies in rice post-harvest processing; and
- d) To the extent that improved technologies can be successfully developed, rural women will be organized and trained for utilization. At this point community organization, extension, and credit will be major inputs although these aspects will be incorporated right from the analytical start of the project.

Judging from the importance and the wide range of activities involved, the time and energy spent (human as well as fuel); and the associated elaborate procedures applied, post-harvest processing and biomass utilization ought to have merited a significant research program a long time ago. Unfortunately this has not been the case. Except for mechanized rice mills and some incipient attempts at developing driers, not much research investment has been made on these problems. In effect, women's tasks have eluded science and technology applications. It is therefore time to examine these processes systematically in a sustained and coordinated fashion employing the best available expertise for the different components.

The research aspect is meant not just to establish the role of women and to estimate the number of hours devoted to these various activities. The intention is to analyze the existing situation with a view to determining what steps (technical, social, educational, economic) can be taken to improve upon present state of technology, skills, knowledge, and institutional arrangements accompanying the application of such technologies. The likely impact of changes in any of these components on productivity, employment, and the welfare of women (farm and landless) and the household will be examined. Obviously, this will require an interdisciplinary approach employing a team of specialists in post-harvest processing, biomass utilization, economics, sociology or anthropology, and extension or community organization.

Implementing Agencies

By the very nature of the project, no one agency can pursue it alone. It is hoped that organizations like BRRRI, BRAC, MCC, BAU, Women's Desk, Grameen Bank, etc. can collaborate with technical and financial inputs from IRRI, NORAD, and other international or bilateral agencies.

- 11) We have suggested to IRRI Management that some effort be made to encourage sending institutions to identify potential female trainees to participate in the many training programs that IRRI sponsors and organizes.

The IRRI Alumni Yearbook 1985 shows that of 1,439 research-oriented trainees only 13% are females. A third of these females are Filipinas and one-fourth are Thais. Of the 1,954 short-term trainees only 10% are females. Of this 10%, almost three-fourth are Filipinos, Thais, and Indonesians combined. Only 5 or 3% of the total number of trainees from Africa are females. This is clearly a gross under representation of the African woman's predominant role in agriculture.

- 12) The draft of IRRI's Strategic Plan for the 1990's and beyond, includes women concerns under socio-economic impact analysis. One objective states that IRRI

will: "sharpen its current program in socio-economic impact analysis to better incorporate income, employment, equity, gender and sustainability issues in the evaluation of proposed and existing rice technology and farming systems".

Under the program on Crop and Resource Management (Rice Farming Systems), the "development and evaluation of technologies for increasing household income and employment opportunities with emphasis on women" is listed as Essential.

In the socio-economics of rice farming systems research, IRRI will focus on refinement of methodology to contribute to:

"improved perspective of equity (including poverty and gender-related) issues in setting research priorities, technology design and evaluation, and in impact analysis".

It was further said that,

"Since 1983, IRRI has paid particular attention to the technology needs of women farmers and laborers in rice farming areas. Development of improved technologies for women-specific occupations as well as the participation in technology development and transfer will both receive attention in the Asian Farming Systems Network".

We have also endorsed the inclusion of a sub-program on Seed Technology since in many countries, seed management is very much a woman's task. But whether for males or females, more attention needs to be paid to seed care. We argued "If seeds are the bearers of science, we should treat them with more reverence so that they will perform their "science" as expected.

- 3) Dr. Pudjiwati Sajogyo of the Centre of Development Studies, Bogor Agricultural University, Indonesia has just been given initial support that will allow her to start some activities intended to integrate women's concerns in the farming systems research sites which are part of the AFSRN. She will work with Dr. Syarifuddin Karama in choosing the sites and in designing the focus of the work. Dr. P. Sajogyo will assist the economist in the farming systems sites and invite other sociologists to participate in the analysis of gender-disaggregated data already available. Dr. Faisal Kasryno, Director of Centre for Agro-Economic Research has

expressed willingness to collaborate with Dr. P. Sajogyo. The latter will also help redesign data-gathering instruments so that women issues will be better incorporated.

14) Some funds were also provided to Dr. Benchapun Shinawatra of Chiang Mai University to enable her to start activities intended to integrate women's concerns in the FSR sites which are part of the AFSRN. She and her colleagues will do their study in Amphoe Phrao, Chiangwat, Chiangmai, a new FSR site of the Thai Farming Systems Research Institute. The specific objectives of the study are:

- a) To describe the existing farming system and the linkages between irrigated and rainfed farm enterprises, non-farm economic activities, and household tasks with particular emphasis on women's roles in the farming system.
- b) To identify sex differentiation with regard to labor, employment, decision-making, income, farm and financial management in the context of the farming system for different economic groups.
- c) To examine women's problems and factors constraining or supportive of women's more productive participation in farming systems such as access to information, productive resources, access to and control over the fruits of production.
- d) To identify potential intervention points for improving the productivity and welfare of different classes of women in relation to men.

The FSR sites we visited in Indonesia and Thailand have gathered data on women's participation, particularly their labor contribution but analysis lags behind. Unless additional social science input is provided, these data are likely to remain raw data. It is for this reason that we have provided seed money to Dr. Benchapun Shinawatra and Dr. Pudjiwati Sajogyo.

15) We also prepared for the FAO mission to the Philippines through Dr. D.L. Umali, a brief paper on Filipino Women in Agriculture and Rural Development in which we

suggested the organization of a National Working Group on the Participation of Rural Women in Agriculture and Rural Development. The major task is to look into existing or planned programs in agricultural extension, cooperatives development, irrigation associations, rural credit, farmers' organizations, agricultural research, barangay council development, family planning, nutrition, and health in order to identify and develop mechanisms for institutionalizing women and household welfare concerns into these programs. This Working Group will be composed of individuals (government and NGOs) who are actually involved in these programs so that there will be a better chance of acceptance and implementation. The Strategy is to include women but not to exclude men. In the case of family planning, health and nutrition, the aim is to include men where women predominate. This Working Group will work with regional, provincial, municipal and village-level groups in order to have widespread participation.

The Philippines in many ways is a strange country with respect to women in agriculture. Despite the fact that our women are not socially segregated, agricultural programs in the past have seldom deliberately included them as major participants in agricultural extension, cooperatives development, credit, Samahang Nayons and other farmer's organizations - including irrigation associations, and village-level development activities particularly those which involve leadership functions. However in family planning, nutrition, health care, food preservation, handicrafts, PTAs, women are regarded as the main targets and men are minimally involved. As a consequence, women bear the burden not only of child-bearing and child-rearing but also of family planning. Female, rather than male-oriented methods tend to dominate. Women suffer all the side-effects or ill effects and on top of that, are required to ask husband's consent for her to accept such methods.

In the case of women concerns in agricultural research (technology development), the attitude is reflected in questions like: "Do we need that?"

accompanied by an amused smile; and "What are the issues about women in agriculture?" The implication is that women already play an important part. Another response is: "Oh! we have no problems about female participation. They participate". But when asked for example, as to how many female farmer cooperators there are in the Regional Integrated Agricultural Research System cropping pattern trials for 1983-1985 in one particular region, there were only 4 females out of 66 farmer cooperators.

In the Crop-Livestock Site in Sta. Barbara, Pangasinan which is a collaborative project between the Ministry of Agriculture and Food, IRRI and UPLB, women were not included in farmer's classes and in general, were not participants in the projects until efforts to integrate them were made. In the beginning, the reply was: "We'll do women later. We have so many other things to do". This attitude has now changed and shifted to something much more supportive and positive whether in technology development, extension, or assessment of impact.

In other words, the fact that women are very visible in the Philippines, and that almost half of our agricultural extension workers are women does not always mean that women's concerns are necessarily taken into account in terms of technology development, etc. We need studies to determine whether, in fact, women extension workers work with rural women in agricultural matters or whether women clients are included only in homemaking affairs.

- 16) The Farming Systems and Soil Resources Institute (FSSRI) through Dr. Virginia R. Cardenas and colleagues has developed a project on Enhancing Productivity Roles of Women in Farming Systems Research and Extension. The project is aimed at understanding the different roles of women in different farming systems: hillyland-based; sugar-based; and coconut-based; and identifying ways by which these roles in each system could be enhanced towards a more meaningful participation in FS development. Since there are action research teams developing

some technologies for these different farming systems, Dr. Cardenas and colleagues are introducing activities to recognize the roles of women in these systems particularly in technology design, dissemination and utilization.

A very small amount of money was provided to their group so that they could participate in the Rapid Rural Appraisal which was conducted in coconut-based systems in Camarines Sur.

n-Going Projects which are Part of the Philippine Component

-) The Institute of Philippine Culture through Dr. Jeanne Frances I. Illo and her colleagues are implementing research on "Men and Women in a Farming Systems Project in the Philippines". This project which is funded by the WID Bureau of USAID in Washington has selected 2 sites (Del Rosario in Pili, Camarines Sur and Cahabaan in Talisay, Camarines Norte). One site has a rainfed rice-farming component.

The research is linked to the Bicol Farming Systems Project particularly with respect to the utilization of research findings and materials for the rethinking of project research and training activities so that women concerns could become an integral part of the Farming Systems Project. Community information and initial profile of households selected for case studies have been collected.

-) The Canadian Embassy through its Mission Administered Funds provided support (thanks to Mr. Gregg Strong and Mr. Jim Carmichael) to the project on Women in Cooperatives Development. This is being undertaken by Ms. Mimosa Ocampo and associates at the UPLB College of Development Economics and Management.

The research aims not only to determine the nature and extent of women's involvement in cooperatives but also to determine the different strategies by which women could be more effectively mobilized and brought to the mainstream of cooperatives development. The outputs of this particular research which is in the data-gathering phase will include: a general profile of women participants; the

nature and extent of their involvement in the coop studied and in the movement as a whole; the factors constraining as well as facilitating their participation; the benefits and effects derived from such participation; the perceptions, attitudes, and value placed on the participation of women as gleaned from various viewpoints. Besides the data from cross-sectional surveys, case studies of some cooperatives highlighting women's involvement in the different operations and their corresponding contributions to the organization and to the movement as a whole will be prepared.

Ms. Ocampo is not waiting for the results of the project to start the sensitization of leaders and trainers in cooperatives. In the multisectoral meeting on cooperatives development held a few months ago, she raised two important issues:

- a) Who are the potential participants in the training programs? Ms. Ocampo wanted to make sure that women will be deliberately recruited into the training programs.
- b) In the Constitution and By-Laws of cooperatives, membership is usually directed toward household heads - which almost always refer to males. Some modification needs to be made in this membership criterion in order to encourage female participation.
- 3) Through the initiative, thoughts and contacts of Ms. Mina Swaminathan, the Philippine component will also include a child-care research component. Thelma R. Paris and her research aides will be involved. Leadership for this undertaking will be provided by Ms. Teresita Quintos Deles, of Social Development Index (an NGO). In our visits to Sta. Barbara villages, we have seen some children whose parents are out at work and therefore have to fend for themselves. We do not know how prevalent this phenomenon is hence our interest in participating in this project using the Crop-Livestock Research site as the initial locale. The first

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meeting of the Steering Committee for this project will be held on November 27, 1986.

As articulated in the perspective plan, we are interested in the impact of new technologies on women and the household including children but as M. Swaminathan argues in a concept paper on The Interface Between Women's Work and the Needs of Young Children in the Developing Countries of Asia:

"The relationship between women's work and the needs and development of their young children has been a neglected one in the developing countries... Students of women's issues have tended to give primary importance to economic, technological, social, and political issues and have tended to assume the traditional arrangements for the care and development of the young are adequate and are continuing as in the past. This approach ignores the consequences of change ... technological change which opens new avenues of employment for women, or leads to the decay of older forms of employment, social and demographic change leading to migration, family planning, changes in the size of the family, mechanization of the household, ... Even if traditional child care arrangements were once adequate, are they still so in the face of overwhelming, changes of this type? How have women's strategies for coping been affected? What new forms of child care have arisen? What are the pressures and tensions on women and on the family? In which sectors of the economy are the effects most felt and which categories of women are most deeply affected?"

The child care research component in the Crop-Livestock research site will most likely start with a documentation of the existing situation with respect to how children are actually being taken care of considering the dynamics of change in women's work, family structure, gender roles, socio-economic status, etc. Problem areas will be identified and potential solutions explored.

Some Interim Assessment

Given the concepts and objectives articulated in the WIRFS perspective plan, we venture to say that the following have begun to take place:

- 1) IRRI has started to play the leader role by initiating the development of a WIRFS research/action research program.
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- 2) IRRI's knowledge base and concrete technologies (Primer, IPM, equipment design, IR-65) and those of UPLB (mungbean, vegetable seeds, cowpea, livestock, animal feeds, mushroom culture, IPM, school on the air, audiocassette, etc) have been introduced to both male and female farmers. We expect further "science intrusion" into farmers' heads as the program progresses. Seed management for example, is a female task so crucial for agricultural production. Both IRRI and UPLB are playing their technical role in WIRFS.
- 3) The catalytic or facilitative role through the AFSRN has been very instrumental in introducing women concerns in FSR.
- 4) We hope that the proportion of female participants in the various training programs will increase to more than 10 percent in the coming years by encouraging national programs to make a special effort to recruit more female nominees.
- 5) Some degree of institutionalization of women concerns in IRRI's research program has taken place as evidenced by the inclusion of gender considerations in socio economic impact analysis and in technology development and extension in the Crop and Resource Management program. A number of WIRFS-relevant projects are being undertaken by IRRI itself or by IRRI in collaboration with other institutions. Program responsibility for WIRFS has been assigned to Bart Duff and Thelma Paris of the Department of Agricultural Economics and to Dr. Virgilio R. Carangal of the AFSRN. In addition, a Post-Doctoral Fellow will be appointed to work with the program. In other words, WIRFS is no longer a floating concept in search of a home and a responsible person.
- 6) The "integration process" in FSR is beginning to happen and there are some very encouraging early results "on the ground" and several other actions have been initiated in the 6 countries: India, Bangladesh, Thailand, Nepal, Philippines and Indonesia.

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Lessons Learned

The most important lesson we have learned from a year's experience in integrating women's concerns in farming systems research is that advocates or recruited co-believers should be there where FSR is taking place. We cannot simply preach on the important role of women in technology development and extension and leave the matter of doing something about it to somebody else (see Appendix 2). Speeches and papers are necessary for awareness and even for sensitization but they are insufficient for changing the current situation. Conferences are not substitutes for field projects which actually integrate women concerns in FSR.

The second important lesson is that it is easier to generate ideas and even project proposals than it is to find funds to support the ideas and the projects. In this regard, the Ford Foundation has been earnest in "putting money where the mouth is". It is their grant to IRRI and to the UPLB Center for Policy and Development Studies (through Dr. Tom Kessinger) which has enabled us to embark on these activities. They have also been responsible for innovative WID projects in India, Bangladesh, and Indonesia.

Dr. Peter Kenmore of the FAO Regional Project on Integrated Pest Control has always believed that women can play a significant role in IPM even before WIRFS was born. His support for the work of five dynamic female scientists has been indispensable. Mr. Gregg Strong, Coordinator of the Canadian Embassy's Mission Administered Funds provided funds for the Women in Cooperatives Development project despite many other competing demands for their funds. USAID, WID Bureau in Washington gave substantial support to Dr. Illo's project.

Perhaps at this stage in the development of the WIRFS program, we should set aside for the moment the idea of within-country network of projects which will constitute the national WIRFS program. Even the choice of a coordinating institution or individual within a country is a politically sensitive issue. But the more pragmatic reason is the

difficulty of locating funds for such purposes. This is a rather discouraging state of affairs because our original intent was to develop national programs which will be the heart of WIRFS. The projects will be theirs and IRRI's role will be catalytic. We had assumed that this approach will provide us a richer source of concepts, strategies, and actual experience from the different countries than if IRRI were to design its own project and find collaborators to implement it in different countries. Our assumption has been very well substantiated by what we found because there is no dearth of creativity and vitality from within the countries themselves. At this point, we have several unfunded proposals and therefore refrain from encouraging development of project ideas with anyone lest we further raise expectations and eventually lose credibility (see Appendix 1).

We have received recently a particularly special research proposal from Marth Alter Chen entitled Women and Household Livelihood Systems in Rural India. As many of us know, she is not just a book writer. The reason why her publications are so full of operationally significant insights is she is there, where the action is; where the poor rural women are. Having seen quite a bit of the literature, her proposal is most attractive to us because the study would be less concerned with "intra-household dynamics that determine how and why gender differentials operate and more concerned with extra-household factors that aid or hinder the livelihood systems of poor households, with particular emphasis on women's labor and responsibilities. This emphasis on extra-household rather than intra-household dynamics is important, as most policies and programs operate through instruments external to the household".

Furthermore, her model adds a sectoral dimension to the analysis, i.e., male and female work streams would be critically viewed according to the sectors of the rural economy from which livelihoods are generated such as: dry-land agriculture; animal husbandry; fuel and fodder collection/production; fruit-vegetable production; and artisan production.

Our brief experience suggests that in terms of being able to do something about poor women's situations, her model might yield more productive results.

Finally, a year with WIRFS has taught us a great deal not only about women but also about agricultural scientists, about IRRI and about donor agencies.

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Appendix 1

Projects provided with seed money so they could get started:

Philippines

- 1) Virginia R. Cardenas, Enhancing Productivity Roles of Women in Farming Systems Research and Extension Farming Systems and Soil Resources Institute, UPLB

The initial work is being done in coconut-based farming system in Bicol, Camarines Sur.

Amount provided: ₱22,700

- 2) Blanda R. Sumayao, Training the Village Non-Traditional Extension Audiences in Integrated Pest Management

The study site is in the same Calamba villages where the IPM project is located.

Amount provided: ₱20,000

- 3) Teresa H. Stuart, Department of Development Communication, UPLB Audio Cassette Technology as Communication Support to "A Farmer's Primer on Growing Rice"

Amount provided: ₱25,450

- 4) Agnes Rola, Coordination of Philippine Component of WIRFS

Amount provided: ₱6,000

- 5) Pilot Testing the Use of "A Farmer's Primer on Growing Rice" in 4 villages of San Miguel, Bulacan. A total of 60 male and female farmers read the primer. Pre and post-tests of knowledge were administered by 3 research assistants of the ASEAN Population Project on Women in Development.

Amount provided: ₱6,000

- 6) Candida Adalla and Agnes Rola, UPLB IPM Technology Verification. This project is funded by the FAO-Integrated Pest Control Manila Office through Dr. Peter Kenmore.

Thailand

- 1) Differential Roles of Men and Women in the Farming System in Amphoe Phrao, Changwat Chiangmai
Dr. Benchapun Shinawatra
Chiangmai University

Amount provided: \$5,000

Indonesia

- 2) Integrating Women's Concerns in Farming Systems Research Sites
Dr. Pudjiwati Sajogyo, Centre of Development Studies, Bogor Agricultural University in cooperation with Dr. Syarifuddin Karama of SARIF.

Amount provided: \$5,000

Unfunded Project Proposals

Philippines

- 1) Fermina T. Rivera, Central Luzon State University
Rural Women Research and Training Program: Building Viable Home-Food Trades
- 2) Meliza Agabin, Technical Board for Agricultural Credit
The Role of Women in Rural Credit and Savings Mobilization: The Integrated Rural Financing Experience
- 3) Obdulia Sison and Luzviminda Cornista, Agrarian Reform Institute and Department of Agricultural Education and Rural Studies, UPLB
Women Labor in Philippine Upland Communities
- 4) Leonardo Chua, Central Mindanao University
Women in Extension: An Analysis of Sex Roles in Technology Transfer
- 5) Filipino Women in Agriculture and Rural Development (Proposal for the Ministry of Agriculture and Food)

Bangladesh

- 1) Bangladesh Rural Women in Rice Post-Harvest Processing and Biomass Utilization (Proposal for a Participatory Action-Research-Training Project)
- 2) Ferdouse H. Hannan, Untapped Resources: Exploring Women's Role in Agricultural Development, Women's Desk BARD and Ministry of Agriculture and Forests

Nepal

- 1) Participation of Women in Rice Farming Systems in Nepal (Focus on the Hills and the Terai)

This will include an identification of prevailing technologies and implements being used by women in different tasks given different agro-ecological environments. It intends to look into prospects for improving traditional technologies so as to make them more efficient and less laborious. Proposal was submitted by APPOSC.

Appendix 2

Some General Impressions and Observations from Trips to India, Nepal, Bangladesh, Thailand, Indonesia and the Philippines

Based on our formal and informal discussions, field visits, and review of materials provided us, we have the following observations:

1. The male leaders in the national agricultural research systems we met do not seem to suffer from the usual "gender-issue-resistance syndrome" which is not uncommon in other research systems, even international ones. As a matter of fact, they appear to be "far ahead" or more "liberal" at least in their articulated views and program direction commitments than what we had anticipated. Contrary to expectations based on cultural stereotypes, we found activities in Bangladesh most exciting and encouraging with respect to women in agriculture and women in farming systems in particular.

2. Practically all the studies on women in agriculture that we have seen were done by social scientists. At this point, we cannot say that there is a dearth of studies on the role of women in agriculture and perhaps a dozen additional studies on the general subject will have marginal additions to what is already known. The earlier studies were extremely valuable for they provided the empirical base for defining the women issue in agriculture and for sensitizing the world to the important role women play which has been undervalued and unperceived. In many instances it is probably fair to say that women at work in agriculture are "physically visible", but "conceptually or culturally invisible" even to those who actually see them. Fortunately, the visibility is improving and therefore the research that we do must go beyond being "sensitizing". Research must be operationally significant i.e., it must indicate to someone who is responsible for policy, program development and implementation a more precise definition of the problem so that it will lend itself to feasible solutions.

We are not saying that research on the role of women in agriculture is no longer needed. What we are suggesting is that such studies must be designed with greater substantive specificity (agro-ecological circumstances; more detailed descriptions of the farming systems, including its different components, agricultural practices, etc., land ownership patterns; seasonality dimensions; technologies available and applied, etc.) so that the results will be operationally useful for technology development, training, extension and agricultural program formulation.

It is very rare, for example that women-in-agriculture studies describe the "particularities" of existing agricultural practices so that agricultural scientists can have a sufficiently reasonable context within which to define their research objectives and design suitable technology.

Even in the currently fashionable time allocation studies Bina Agarwal argues that:

"A sound empirical base for assessing the time contribution of rural women in the agrarian economy is needed. For this, a detailed analysis of their work by activity would be essential, to capture the seasonal, operation-wise, crop-specific variations in the work, as well as to make a more appropriate distinction between domestic and non-domestic work. Such an analysis would also be necessary for identifying and measuring the likely impact (time saving or using, income generating or reducing) of technological change and agricultural modernization programs on rural women's work. In

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this context, the possible differential effect of technological innovations on women belonging to different socio-economic classes needs to be kept in mind, and information obtained by class divisions: certain innovations may reduce the work burden of women in higher income households, and at the same time also reduce the income-earning capacity of the poorest women...

Seeking data on the time-allocation patterns of rural women, on a national basis, is perhaps not a practical proposition. However, detailed region-specific, micro-level research focusing on these aspects could help to provide more appropriate definitions for wider-based data gathering." (Bina Agarwal, "Work Participation of Rural Women in the Third World: Some Data and Conceptual Biases" August 1984).

To this, we would like to add the need to include not also crop but also livestock, fishing, bee-keeping, etc. activities and the backyard, kitchen-garden, homestead type of production as distinct from the outside field production. But knowing how much time is devoted to these activities is not sufficiently directive for agricultural research and extension purposes. The specific technologies applied (seeds, equipment, cultivation practices, such as land preparation, fertilization, pest and disease control, etc.) and women's participation in these specifics must be indicated. Furthermore, female labor is human labor possessed with intellectual, manual and managerial skills. Rarely do we find studies which try to determine what women know (their level of technical knowledge) about the agricultural technologies they are applying. We likewise need to assess their skills and experience (technical, manual or manipulative, and managerial). Why is it that for population studies which certainly focus on women, KAP (Knowledge, attitudes practice) questions are standard ingredients but in women in agriculture, we have yet to see systematic attempts along this line? Such information is crucial for defining extension and training objectives and for determining program content and approaches. In an agricultural system that is more science-based and more farming system than single-commodity-oriented, the knowledge, skills and management capabilities required will be a bit different. Even traditional farming has to be better understood in the light of changing resource base (land, water, soil fertility, etc.) and technology options in order to improve the goodness of fit between what exists and what is possible and feasible.

Obviously such studies cannot be adequately designed by social scientists alone. They must have some input from agricultural scientists. In our discussions, we felt that social scientists tended to be a bit more resistant to collaborate with agriculturists than vice-versa. (We hope we are wrong in this assessment.) So what happens is: social scientists do their research on the consequences of new technology (usually bad!!!); while agricultural scientists pursue technology development with not much help but a great deal of criticism from social scientists.

The current FSR vogue requires teamwork between social and biological scientists. The BARI and BAU projects look very promising on this score. The FSR in Thailand has some encouraging start. Nepal has potentials for moving in this direction especially if livestock can be integrated in the FSR sites; the role of female agricultural assistants enhanced; farm women more deliberately involved; and some social scientists persuaded to join in. All of the above seem to be at the "entrance door" ready to come in with the appropriate push.

3. Agricultural universities with their corresponding Directorates of Research and Extension Education and some with Colleges of Home Economics are institutionally well-established in each state in India; are in place in many provinces of the

Philippines; have been established in three regions of Thailand; and are beginning to be developed in Indonesia outside of Java. Bangladesh has BAU at Mymensingh. What was quite a discovery for me as a newcomer to India is the extent to which the "Indianized" US Land Grant University model with its trilogy of functions seems to have taken root and bore fruit to a degree which the Philippines has not quite adopted despite its strong American colonial links. But the reason for mentioning agricultural universities is not really to dwell on the land grant system per se but to remind ourselves that if we are serious in pursuing the major objective of the Women in Rice Farming Systems Research/Action Research Program which is: the institutionalization of women's concerns in national agricultural research and extension systems, agricultural universities along with autonomous or Ministry-related Research Institutes and Departments of Agricultural Extension are going to be the key actors. The more closely the women-in-agriculture social scientists work with these institutions, the better are the chances that something concrete will materialize.

To illustrate, what we mean, it is worth noting here that the Indian Association for the Advancement of Science in a recent document on Women in Agriculture in India has highlighted the following:

"In recognition of the role of women in agriculture, they were for the first time, included as a target group in the farmers' training and education scheme of the Department of Agriculture. The scheme was started during the 4th Plan period in 100 HYV programme districts and included women initially with the idea of promoting consumer acceptance of newly released HYV of cereals and millets, as well as to acquaint them with the importance of the HYV programme in improving the nutritional and economic status of the families.

The other programmes which recognized the economic role of women in agriculture and allied fields of activities are the Krishi Vigyan Kendras of the ICAR and establishment of Home Science Colleges with Agricultural Universities. The scheme of Krishi Vigyan Kendras was introduced in the year 1975-76 with the objective of bridging the gap between the knowledge of farmers and farm women and the technology available."

What we are not aware of, are studies of such schemes which will tell us how they have functioned and what impact they have had on women and the household. We will certainly need to look into this.

The East India Project will be a model to watch in many respects.

4. Our enthusiasm for greater projection of the role of Colleges of Home Science in Women in Farming Systems was not uniformly received with equal enthusiasm.

There were those who think that this will only reinforce the homemaking role while others feel that these colleges are too middle-class and urban household-oriented in their programs. In Bangladesh, a study of women extension workers mentioned that one constraint they faced was: "the training oriented then mostly in field crop extension services but their target audience expected from them more about home life improvement services". It is not clear however as to which socio-economic class these women clientele belong to.

Based on our visits to 2 Home Science Colleges in India and based on the program description of the Bangladesh Department of Agricultural Extension's Programme for Women, it seems that their extension programs go much beyond the traditional middle-class homemaking concerns. For example, in Bangladesh, the work of female block supervisors include the following seven broad areas:

- a) Homestead level vegetable and fruit cultivation.
- b) Family nutrition, hygiene and sanitation.

- c) Pisciculture.
- d) Food processing and storage techniques.
- e) Homestead-level income-generating activities.
- f) Population education.

In Haryana and Pantnagar, our impression is that their definition of home science includes a large agriculture component where women are involved.

Since household management tasks have to be accomplished by someone (not necessarily only by women), we suggest that in the training programs for male farmers, household-oriented knowledge and skills traditionally defined as women's domain should gradually be made part of their agricultural training. In other words, there is no reason why nutrition, population education, hygiene and sanitation should not be introduced to the men of the household in the same way that we argue for the importance of women learning more about modern agricultural technology whether or not they are physically involved in farming. Farm and household decisions are not independent of each other and usually both males and females are involved in decision-making.

5. There are several, perhaps even many, action programs which have a direct bearing on women-in-agriculture in both government and non-government sponsored agencies in India and Bangladesh and some in the Philippines and Nepal. We have to find out about Thailand and Indonesia. Unfortunately, in the women-in-development conferences both local and international, the "doers" are seldom invited. If they are, they do not play starring roles because they usually are not the prominent paper writers and book authors. In order to redress this imbalance and to project more the work of those who are directly engaged in reaching rural women, we need more social scientists who are sympathetic to action projects to interact more with those who are doing the action. Furthermore what is needed is more social and economic analysis to accompany the "actions" and not just to do the post mortem. In the research on action which is being proposed, the process and dynamics of getting things done require as much analysis as benchmark and impact in order to derive lessons, improve performance, share and transfer experiences for wider application.

More intensive involvement of, of social scientists (in a research role) in these action-type activities will give them more realistic, down-to-earth insights into what it takes to develop technology and to promote its utilization. Perhaps this will influence social scientists to work in partnership with agricultural scientists and extension specialists to help make the process and the product "right" or at least less wrong instead of always playing a self-righteous or "bearer of bad news" role.

When social scientists call for "special focus in policy on the employment and income requirements of women who are the main or sole income earners; and for a special consideration of the gender implications of any income and employment impact of technological change", which specific institutions, agencies or programs are being addressed? If it is nature of the technology which is being referred to, agricultural research institutions (national and international) including agricultural colleges and universities seem to be the institutions being alluded to. If it is women's lack of access to technology and credit which is the problem, perhaps agricultural extension and other related agricultural development programs are being referred to. Unless and until the policymakers, agencies and programs being called upon are more clearly specified, the responsibility for doing something about the problem will not be assumed by anyone. Therefore, if we want concrete actions to be taken, it would be more appropriate to work with those who are in a position to act in behalf of women in agriculture. We must now

move beyond "sensitizing" policymakers and those responsible for setting agricultural research agendas. In working with them to formulate these policies and put the "right" items in the research agenda there is a need for more definitive analysis and empirical evidences to guide action. In a joint undertaking we might discover that technology development and extension is a much more complex and infinitely more difficult process than when viewed from a somewhat "adversary" distance.

An excellent illustration of the type of analysis and research on action which we would like to see more of is Martha Alter Chen's: A Quiet Revolution: Women in Transition in Bangladesh. This book describes "the efforts of the Bangladesh Rural Advancement Committee (BRAC) to reach poor village women with projects designed to increase their material and social resources". Her purpose in writing the book was "to give the reader an insider's view of what it takes to develop such a program and what it means to participate in that program".

The argument for greater specificity which we put forth earlier is very well demonstrated in her Chapter VIII entitled: From Experience to Policy.

"Although most women everywhere work at a disadvantage, the particular situation of women differs between classes, villages and countries. I would argue strongly for a situation-by-situation analysis of women's roles and constraints before programs are designed or plans formulated. I would suggest the following variables be assessed in each particular situation:

- is the hierarchy by sex or by class more predominant.
- is the economy labor-surplus or labor-scarce
- is the economy land-surplus or land-scarce
- what is the dynamic of household size and composition over time
- what are the traditional tasks and skills of women
- which tasks of women are essentially income-conserving
- which tasks of women are potentially income-producing
- which tasks of women carry high status
- which tasks of women carry low or negative status
- how many women are managing the day-to-day needs of their households
- how much access do women have to rural labor markets, credit, inputs, technical assistance and extension services?
- why do I argue that one needs to understand the specific mix of these variables in each situation? Consider the following policy implications from such an analysis: in societies where the class hierarchy is not pronounced, the constraints and needs of women may not differ significantly by class and gender issues may assume priority over class issues
- in societies where the class hierarchy is pronounced, the constraints and needs of women will most likely differ by class and class issues may take priority over gender issues
- in economies where labor is scarce, the introduction of labor-saving devices may make sense
- for tasks which women perform primarily to conserve income and which are routinely burdensome and time-consuming, the introduction of labor-saving devices may make sense (particularly if women's labor and time can be released to some productive end)
- in economies where there is a surplus of labor, the introduction of capital-intensive devices may have very negative effects (particularly on women who perform the "invisible" labor most often displaced)

- in societies where class hierarchy is pronounced, it is important to recognize the differences between women of different classes
- in societies where all women do not necessarily face the same degree or type of problems, it is important to decide which women one wants to benefit in what ways
- in situations where the differences between women are pronounced, it is better to organize women into economically homogeneous cooperative groups (to forestall latent conflicts)
- in situations of significant change (either planned or unplanned), it is important to monitor the impact of change on women's traditional work, on women's access to wage labor, and on women's access to public goods and services.

6. We were asked many times why our program was focusing only on rice farming systems. Our reply is that rice farming systems is a strategic starting point since rice is a dominant staple crop in Asia but the term "farming system" which follows the word "rice" covers a wide territory: from wheat, to corn, to oil seeds to potatoes to agroforestry, to livestock, to fish, to forage, etc.

Appendix II

IRRI Saturday Seminar
Agricultural Economics Department
31 January 1987

Preliminary (for
internal use only)
Not for quotation

WOMEN IN RICE FARMING SYSTEMS: A Preliminary Report of an Action Research Project in Sta. Barabara, Pangasinan

Thelma R. Paris*

I. Introduction

As early as 1979, a few IRRI studies deliberately gathered data on the role of women in rice production (Duff, 1979; Res, 1979). However it was only in 1983 that IRRI gave explicit attention to evaluating the role of women in rice farming systems by convening a conference involving biological scientists, social scientists and policy makers. The specific objectives of the conference were to discuss:

- a) women's roles in rice farming
- b) whether women have benefited from past introduction of new rice technology and;
- c) how they might benefit from emerging technologies.

Available evidence shows that many studies have underestimated the impact of new technologies on women in general and particularly women wage laborers (Agarwal), 1983, Unnevehr and Stanford, 1983). Concern for

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women as recipients and users of technology was evident not only at IRRI but also at other international centers under the CGIAR system. As a follow-up to the Conference on Women in Rice Farming Systems in September 1983, an Inter-Center Seminar on Women and Agricultural Technology was held in Bellagio, Italy. This seminar was held to examine the incorporation of a technology user's perspective, specifically the role of women in the research programs of the International Agricultural Research Centers (IARCs). It was discussed that neglect of women specific issues leads to inefficient technology development and transfer programs in those cases where the users are women, and that new technologies may have negative consequences on women (Dey, 1985). To develop greater awareness of women's roles in agriculture and their special needs as technology users and beneficiaries it was agreed that international and national agricultural research centers should develop long-term strategies to involve women, where possible, in all phases of research and technology development work.

Following the Bellagio meeting, a project design workshop on women in rice farming systems was held at IRRI in April 1985. At this meeting, it was proposed that IRRI organize a collaborative effort to undertake research/action projects in five general programs areas:

- a) women and technology development - will integrate the concept of women's various roles within the household and the farm into farming systems research;
- b) women and extension - will include women in various extension programs dealing with agricultural technology development;
- c) impact of technologies on women and the household - will evaluate the effects of technologies on women and children including socio-cultural, institutional and economic considerations;
- d) complementary studies - will include studies such as dynamics of household behavior; the functioning of rural labor markets; the policy environment which affects farm and household decisions;
- e) sensitization - will sensitize relevant experience, data and analysis generated from projects of this network and elsewhere, to reach agricultural scientists, policy makers, development administrators, farmers and women themselves.

The ultimate aim of this collaborative work is to institutionalize women's concerns within agricultural research and extension programs on rice farming systems. Hopefully this will be achieved by:

- a) incorporating rural women's concerns into on-going programs both in IRRI's outreach programs and at IRRI itself;

- b) for IRRI to stimulate Women in Rice Farming Systems (WIRFS) research in the national agricultural research centers (NARCs), in non-specialist universities, national development research institutions and in non-government organizations; and
- c) establishing a network to promote a concern for WIRFS issues at a national level, and provide appropriate data for development planning purposes. One strategy is to develop the collaborative work in WIRFS under the Asian Rice Farming Systems Network (ARFSN).

This paper deals with the on-going activities under the program area of women and technology development. The objective of this program is to demonstrate that specific concern for women in both the technology development and dissemination phases of farming systems research increases the effectiveness of agricultural research and extension. This produces positive effects from technical change on women's welfare and the entire household. The strategy for achieving this goal is to integrate women's concerns within a farming systems project using the farming systems approach.

Why integrate women's concerns in FSR?

The farming systems approach views the farm as a complete system and focuses on the interdependencies among the different components under the household's control and examines how these components interact with physical, biological and socio-economic factors beyond the household's control. The approach involves description of the local farming systems and identification of its constraints; reviewing existing technologies and techniques to overcome these constraints and selecting, testing and adapting recommended technologies to the conditions in which men and women work.

Within the farming systems approach, the household unit is the hub of the rural farm. It is this unit that makes management decisions, provides labor, markets products and performs many other functions within the farm. When new crop and livestock technologies are introduced into the smallholder sector, it is the household composed of men, women and children who must decide whether to adopt the innovation and reallocate resources to support the innovation.

It is apparent that as part of the household, women play an important role in many activities particularly in:

- a) crop production

- b) seed management
- c) post-harvest
- d) biomass utilization
- e) marketing of crops and livestock
- f) care and maintenance of livestock including provision of fodder;
- g) collecting water and fuel for the household
- h) preparing food for consumption and as
- i) managers of farm related activities

Empirical evidence shows that rural women in Asia contribute significantly to the physical production process. With the exception of Bangladesh, women generally supply the bulk of the labor force in transplanting, weeding and harvesting. A high proportion of total agricultural labor for rice production is hired, with 58%, 45% and 28% of the total hired labor force consisted of women in Andra Pradesh, India, Java, Indonesia and the Philippines, respectively (Unnevehr and Stanford, 1983). In the 1979 IRRI study on "The Consequences of Small Rice Farm Mechanization", the contribution of female labor in non-mechanized rice production system in West Java, South Sulawesi, Central Thailand and the Philippines ranged from 43% to 56% of total labor. On the fully mechanized farms, the female labor contribution ranged from 16% to 58%, with South Sulawesi having the lowest female input (Duff, 1979).

Data from studies in Indonesia, Nepal and The Philippines show that women play an important and often dominant role in farm decision-making. (White, 1984; Acharya and Bennette, 1981; Ministry of Agriculture, 1983). Women's management tasks include:

- a) selection and storage of seeds
- b) purchase of inputs
- c) hiring and supervision of labor
- d) arranging exchange labor groups, and
- e) marketing

In the Philippines and Thailand, women are generally custodians of the household cash. (Dey, 1985).

Despite this empirical evidence, women have not been perceived as farmers and farm laborers and historically the reference farmers has always been male. Consequently, the traditional target user-beneficiaries of technologies, agricultural information, extension services, training, credit, organization, as well as policies have always been male farmers (Castillo, 1986).

Within a farming systems research project, mechanisms were developed by which women's concerns were considered at the various stages of the technology development process specifically in the design, dissemination and extension phases. According to Castillo, 1985 and Cloud, 1985 the basic elements for achieving this are:

- o analysis of women's productive activities within the farming systems including their roles in the household and agricultural production;
- o identification of existing, emerging, and future technology options conducive to the expansion of women's productive capacity;
- o greater understanding of the factors constraining or supportive of women's more productive participation in farming system such as access to information, organization, productive resources, access to and control over resources;
- o application of this understanding throughout the farming systems research process;
- o and pilot testing of promising technologies.

In order to test this approach, it was decided to undertake field level research at an ongoing farming systems research test site in the Philippines. Sta. Barbara, Pangasinan was selected in January 1986.

II. The Farming Systems Project (Crop-Livestock) in Sta. Barbara, Pangasinan

The Crop-Livestock project in Sta. Barbara, Pangasinan is one of the Asian Rice Farming Systems Network (ARFSN) sites at which the WIRFS program is being integrated. This project which started in 1984 is a collaborative activity between the Institute of Animal Science, University of the Philippines in Los Baños; the Ministry of Food; the Rice Farming Systems

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Department and the Department of Agricultural Economics of the International Rice Research Institute. The FSR team includes an animal nutritionist, animal breeder, veterinarian, agronomist, economist and a sociologist. The major objective of the project is to improve existing farming systems through an integration of suitable crop and animal production technologies. Specifically, this project is developing ways of increasing utilization of crop-by products and residues as animal feeds through crop-livestock research (Roxas et.al,1984). To achieve these objectives, several onfarm trials are being conducted at research sites, in Malanay (irrigated) and Carusucan (rainfed) in Sta. Barbara, Pangasinan.

Description of the sites

Location

The Crop-Livestock project is located in two villages of Sta. Barbara, Pangasinan, which is 262 kms. north of Manila. (Fig.1) This town consists of 29 villages which are accessible through secondary feeder roads. The town is close to major trading centers like Dagupan City and Urdaneta, Pangasinan. The latter is one of the largest livestock auction markets in the country. (Cabanilla, 1984). Sta. Barbara was chosen because of its nearness to major livestock auction markets, potential for crop and livestock improvements and proximity to government support agencies and experiment stations.

Malanay is located at the eastern part of the town proper. It is one kilometer from the town proper and is traversed by the main highway leading to commercial centers. Before entering this village, there is an irrigation system which was installed by the National Irrigation Administration (NIA) in March 1972. The presence of the irrigation systems enable farmers to grow two crops of high yielding rice varieties in a year. This village suffers from severe floods during the peak rainfall in August. Malanay has 6 small variety stores, a health clinic, a rice warehouse, a chapel and an elementary school. Because of the absence of a formal market in this village, the people go to the town and other nearby villages. The nearest rice mill is located one kilometer from this village.

Carusucan is located at the southern portion of Sta. Barbara. It is connected to the main highway leading to commercial centers by a 1 kilometer stretch of unasphalted road. In spite of the short distance from the main highway, very few vehicles service into this village. Located at the entrance of Matic-matic, a village before reaching Carusucan, is an old irrigation system installed by NIA in 1956. However, because of the lack of funds to maintain the system, NIA abandoned the irrigation systems in 1958 causing the farmers to grow one crop of HYV rice in a year. This village has one small variety store, a chapel and an elementary school.

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There is no formal market, rice mill and health clinic in this village. Unlike Malanay, Carusucan is not served by the local electric company.

Agro-climatic characteristics

Sta. Barbara falls under a climate characterized by 5-6 wet and 3-4 dry months. Rains come as early as April or May but the peak level of rainfall comes around August which usually cause floods particularly in Malanay (Fig.2). The rainfall ends in late September thru October and averages 2200 mm annually.

Demographic characteristics

Malanay has a higher population density and landless population compared to Carusucan. In Malanay, 53.7% of the total households have agricultural lands while 46.3% are landless. The population density is 1291 persons per square kilometer. In Carusucan, 78.5% of the total population have agricultural lands while 21.5% are landless. The population density is 598 persons per square kilometer (Table 1).

There are more males than females in both villages. In Malanay, 51% and 49% of the total population are males and females, respectively. In Carusucan, 53.7% and 46.3% of the total population are males and females, respectively. In Malanay, female population is slightly higher than male population belonging to the productive age group. The distribution of population between the children (0-14 years old) and adults 15-64 years old is almost equal at both sites. Five percent of the population are 65 years old and above (Table 2).

Education

Literacy rates are high at both sites. Forty-five percent of the adult population have finished elementary school. In Malanay, more females (70%) than males (30%) were not able to receive formal education while more females (58%) than males (42%) finished college. In contrast, more males (58%) than females (42%) were uneducated and more males (58%) than females (42%) finished college in Carusucan (Table 3).

Selection of sample households

A benchmark survey of 25 samples in Carusucan and 40 samples in Malanay was conducted in 1984 by the Ministry of Agriculture. Household cooperators from each village were selected from the benchmark survey of the two sites. The selection was based on criteria developed for on-farm cattle fattening trials as well as the household's willingness to collaborate. Twenty households from Malanay and 18 households from Carusucan were finally selected as household-cooperators for the crop and

cattle fattening trials on farm trials. Whole farm and simplified records of crop and livestock activities were gathered and analyzed by the economics group of the Ministry of Agriculture. The same cooperators were also included in the Women in Rice Farming Systems Project.

Household characteristics

On the average, a male farm operator was 44 years old in Malanay and 45 years old in Carusucan. At both site, spouses were 2 to 3 years younger than the husbands. Both husband and wife had six years and five years in school in Malanay and Carusucan, respectively. The farmers in Malanay have more years of farming experience (23 years) than farmers in Carusucan (16 years). A typical farm household in Malanay has 7 members, 4 of whom work regularly on the farm while a household in Carusucan has 6 members, 3 of whom work regularly on the farm (Table 4).

Labor

Family, hired and exchange labor are used in rice production activities at both sites with the family providing the main source of labor in rice production. Of total labor for rice production, 13% and 17% are contributed by women in Malanay and Carusucan, respectively. Hired labor is an important labor source in Malanay and exchange labor is commonly practiced in Carusucan (Table 4).

Land Use

The dominant cropping pattern in Malanay is HYI rice- HYV rice. Sixty nine percent of the total crop area is planted to double cropped rice. Establishment of the second crop and planting mungbeans after the main rice crop depends upon the release of water from the National Irrigation System.

In Carusucan, 69% of the total crop area is planted with one HYV rice. Lands are left fallow for the carabao and cattle to graze on. A few farmers grew local varieties of local mungbean or cowpea whenever residual moisture remained after the main rice crop. Glutinous rice (traditional varieties) occupied nine percent of the total crop area. Four percent of the total crop area were planted with local varieties of cowpea.

IR-42 is the most common HYV grown with an average yield of 4.3 t/ha. in Malanay and 2.9 t/ha in Carusucan. In general, farmers in Malanay use higher fertilizer levels (80-100 kg N/ha) than in Carusucan (30-40 kg N/ha). The average landholding in Malanay is 1.92 has and 1.19 has in Carusucan (Table 5).

(6)

Land Tenure

Of the total crop area, 71% and 26% are under share-tenancy and leasehold, respectively in Carusucan. Thirty nine of the total crop area is under share-tenancy and 6% of the total crop area is under leasehold in Malanay. (Table 5).

Livestock

At both sites, carabao is mainly used for draft while cattle are used either for draft, breeding or fattening. These large animals are also raised for security reasons, as collateral for production loans and as means of farm transport. The number of draft animals per ha was 1:2.1 in Malanay and 1:1.2 in Carusucan (Table 5). The carabao is more widely used in Malanay while cattle are popularly raised in Carusucan.

Swine are raised for fattening and breeding at both sites. The income from swine is used to provide cash during the planting season and for the household's immediate needs. Chickens are raised either for home consumption, food for hired and exchange labor during the planting season and sold in times of immediate needs. Chickens are not housed and subsist on minimal feeding.

At both sites, large animals depend on rice straw for feed while swine and poultry are fed with rice bran, middlings and broken rice. Animal manure is used as compost for crop production. In Malanay, rice husks are used for fuel while dried cow dung is used for fuel in Carusucan.

Sources of Income

Farming is the major household occupation at both sites. Fishing, working as hired labor in land preparation, transplanting, hauling, carpentry and construction work are the major sources of off-farm and non-farm income for men. Women earn income by working as hired labor in pulling of rice seedlings. Fattening pigs for sale and selling vegetables are other sources of income for women. In Carusucan, processing and selling glutinous rice is an important income generating activity during the dry season. As expected, gross income is higher in Malanay than in Carusucan (Table 5).

Recommended Technologies

In Malanay (irrigated site) where two HYV crops are grown, component technology trials such as variety, fertilizer rates and green manuring (e.g. Sesbania rostrata) are being conducted. Growing of forage grasses to increase fodder supply are also being conducted by agronomists from the Ministry of Agriculture and Food and the IRRI Rice Farming Systems

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Department. In Carusucan (rainfed site) where farmers grow only one HYV rice crop, growing a high yielding, early maturing legume crop (mungbean, cowpea) before or after rice has been recommended to provide more food and additional income for the household as well as animal fodder (Godilano, 1986). In both sites, Leucaena feeding and rice bran supplementation with rice straw during the dry season has been recommended by the livestock nutritionists. In Malanay, artificial insemination is now being introduced to improve the breed of the carabao in that area.

III. Describing Women's Participation in Agricultural Activities

It is important to understand at the start of the research process the spheres of influence in agricultural production and decision-making of household members particularly of women. Although researchers particularly economists often assume that the households allocate scarce resources to maximize benefits for all, e.g. increased family income, it is important to be sensitive to situations wherein there exists separate or conflicting interests within the households that may constrain the adoption of the proposed innovations. Knowing whose labor and resources will be affected by the proposed interventions will contribute to a clearer understanding of constraints at the household level and the development of more realistic criteria for evaluating the various component technologies tested in farming systems research.

During the initial stage of the project, a benchmark survey had been carried out to gather information about the household, landholdings, cropping patterns, livestock inventory, utilization of crop residues, livestock feeding practices and constraints in crop and livestock production. There was, however, a lack of information on the specific tasks and responsibilities of men, women and children in crop and livestock activities. The economics group has just begun collection of farm labor data disaggregated by sex and source through farm recordkeeping. The information gathered from recordkeeping included activities related only to large animals (carabao and cattle) and not to swine production which turned out to be an important women's activity and an important source of finance for household activities and crop production. Thus, a diagnostic survey of the population was carried out to identify the specific tasks that men and women undertake in crop production. Because there was little understanding about swine management and feeding practices, a different method of gathering information was used. Informal, structured interviews were held with nineteen (11 crop-livestock cooperators, 4 non-cooperators, 4 landless) and eighteen (10 crop-livestock cooperators, 5 non-cooperators, 3 landless) households rearing large and small animals in Malanay and Carusucan, respectively. Questions were directed to women rather than allowing the men to answer for them. The interviews was also used to test simple methods of gathering information disaggregated by sex. The objective was to provide reliable and timely data to the FSR team to permit

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incorporation of women's concerns at the outset of the research process particularly in the design and dissemination phase, rather than doing it later after the project was completed. Knowing "who does what" will provide information as to whose labor is affected by specific interventions. The simple method of reporting who does what in crops and livestock activities allows a disaggregation of labor by activity and gender.

Crop Production

In general, men are heavily involved in production while women are primarily involved in marketing at both sites. In rice production, land preparation, transplanting, and threshing are mainly done by men while pulling of seedlings is a women's task. Harvesting, buying of inputs, conveying palay to the mill, and marketing of rice are done jointly. In Carusucan where glutinous rice is grown, cooking and marketing are mostly done by women while handpounding grain is done by men. It is interesting to note that men are more involved in marketing rice while women are more involved in marketing processed glutinous rice. This is because at the time demand for processed glutinous rice is highest, men are already busy harvesting the main rice crop. Women also generally possess a clearer understanding of consumer's preferences and prejudices and have easier access to marketing information and prices. For farms growing mungbeans, women were more involved in broadcasting, harvesting, threshing, marketing and buying of inputs. Growing of vegetables was handled by men while marketing is the responsibility of women (Tables 6 and 7). The increased output resulting from improved technology (mungbean, cowpea) have to be marketed outside the village. Handling the marketable surplus is an important contribution of women.

Livestock production

In general, men are responsible for large animals (carabao and cattle). Women normally handle swine and poultry. Despite the traditional view that large animals are men's business, women do participate substantially in their care. Unlike rice production which involves considerable specialization of labor, there is flexibility for substitution of labor among family members in routine animal care activities. Putting up of an animal shelter, stacking rice straw, buying and selling of animals are mainly done by men but women and children help or replace men in gathering forage (straw, Leucaena, grasses, etc.) feeding, providing water, grazing the animals, cleaning the pens and bathing the animals. Collecting dry cattle dung as practiced in Carusucan is generally done by women (Tables 8 and 9).

In swine production, except for putting up of animal shelter, the care and maintenance, buying of rice bran, taking rice for milling and buying

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and selling swine are women's responsibilities (Table 10). When Leucaena feeding intervention was being introduced at the initial stage of the project, women were not involved in the discussions. It was assumed that men would gather Leucaena for the cattle. Problems in the adoption arose.

A sociologist conducted a case study on the non-adoption of this particular intervention. Since feeding Leucaena to cattle was new, problems were encountered: gathering of the leaves disrupts the farmer's routine and there are other misconceptions such as the Leucaena's abortive effect on cattle, a side effect evident in the case of pregnant sows. (Juliano, 1985). Feeding Leucaena and rice bran to swine is part of women's routine activity. These important information became evident only after examining women's participation in livestock (large and small animals) activities. In times of scarcity (during the dry months), hard decisions are often necessary whether to feed rice bran and Leucaena to cattle or swine. Interviews with both men and women indicate greater preference is given to swine because there are alternative feed sources for large animals. Clearly these decisions will affect the degree to which rice bran and Leucaena are fed to cattle, a strategy being promoted by the livestock nutritionist.

Women are not only primarily responsible for the maintenance and marketing of swine but also for the decisions pertaining to milling of palay from which the bran is derived. These decisions determine the texture of the rice bran (fine or coarse processed either Engelberg "Kiskisan" or cone-type mills produced) suitable for cattle or swine feeds. Decision-making processes have just started to be studied in detail.

IV. Exploring Possible Technologies Which Would Benefit Women

To develop an understanding of the role of women in both crop and livestock activities, the researchers lived at the sites, talked with key informants, and observed on-going activities. During the visit in Carusucan, the processing of glutinous rice was underway. At this point the research team realized that the processing of glutinous rice in this rainfed site was a major traditional activity and a significant source of income for women. Glutinous rice is grown and harvested two weeks earlier than other rice varieties to take advantage of the high price on November 1st (All Saints Day) a special Filipino holiday. Demand for glutinous rice is high at this time as it is used as the main ingredient in rice delicacies. A unique feature in the preparation of glutinous rice is the manner it is processed into black grains, a feature the consumers in Pangasinan prefer in making rice delicacies.

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Method of processing "Dirimen" (Black glutinous rice)

The original process for producing "Dirimen" (black glutinous rice) is to burn the glutinous rice panicles at the hard dough stage using bamboo "buho" for fuel. When all burnt panicles have fallen off, these are handpounded and winnowed three times. A can (12 kgs) of the local variety used will take about 15.5 hours (6 hrs for burning, 6 hrs for pounding and 3.5 hrs for winnowing). Because of the increasing scarcity of fuel and demand for black processed glutinous rice, a new adulteration process (adding charcoal to blacken the grains) is widely practiced. Discussions with older people reveal that a black rice variety was actually used previously but has disappeared from the market. Instead of burning the panicles directly, newly harvested glutinous rice is washed to remove the empty grains or soaked for a few minutes (for old stock), and then parboiled. Parboiling carried out in a shallow galvanized basin over a crude furnace made of clay which uses dried cow dung and other kinds of fuel. After parboiling, the wet paddy is stirred in the basin until the grains are nearly dry. This is the most critical part of the process because the grain should be gelatinized but not puffed. The traditional process consumes considerable fuel and the continuous stirring is very laborious. When the water has evaporated, the grain is cooled for 5 minutes and then hand pounded to separate the hull from the grain. A second handpounding incorporates the charcoal with the milled grain to produce a black product. One 12 kg can of glutinous rice takes about 4 to 6 hrs to process. Because the processing is performed by informal groups (relatives, friends) there is no payment for the labor. Men, women and children are involved in this activity. Thirteen sample households were interviewed to estimate the total time required for processing. Sixty-two percent, 35%, 52% and 96% of the total time spent in cooking, handpounding, adding charcoal and winnowing were contributed by women (Table 11). Fifty-four women involved in glutinous rice processing/selling were interviewed to find out the profits gained in this activity. On the average, about 348 kgs of newly harvested glutinous rice were handled by a female processor/seller during the 2 month period (September to October). Analysis of costs and returns of processing glutinous rice shows that for every peso invested P/1.79 can be earned (Table 12). Three women of the samples were able to process large quantity and grossed about P 13,000 each. Of the total gross income received by 17 WIRFS cooperators, 13.5% came from earnings from glutinous rice processing and selling. Income derived from wages through pulling of sellings and harvesting is quite low at 1.2% (Table 13, Figs. 3 & 4). Glutinous rice were bought from other farms. These women awoke at 3:00 in the morning to arrive at the Urdaneta market early to secure advantageous selling places.

V. Incorporation of Women's Concerns in FSR

The importance of incorporating women's concerns was underscored in a crop-livestock workshop which was held to discuss the accomplishments and plans of the project. The workshop concluded that because women are intimately and subsequently involved in farm production, decision-making, processing and marketing, they should also be included in all discussions pertaining to new or improved technologies. It was generally recognized that as partners in production and income generation, the productivity of women could also be enhanced by increasing their technical knowledge about farming practices, provision of skills, employment opportunities and developing technologies which will benefit them.

As a result of these discussions involving the livestock nutritionist, agronomist, animal breeder, economist and sociologist several developments involving women were undertaken: (a) conducting crop and livestock classes; (b) testing glutinous rice varieties; (c) developing cooking devices for processing glutinous rice; (d) training in mushroom production; (e) introducing the "Farmer's Prime" on Growing Rice and (f) organizing farmers' association.

a) Conducting crop and livestock classes

A series of classes were conducted on topics based on the needs indicated by the men and women in the project. The classes were held to develop understanding about the recommended technology to promote active interest in project activities; to maintain interaction between the scientists and the farmers; and to obtain feedback about the proposed technology.

For the first time, women are included in farmers' classes. At both sites, the female livestock nutritionist explained the importance of the nutritive value of different crop residues and fodder. Many farmers admitted uncertainty about their particular feed value. She clarified misconceptions about the abortive effects on pregnant cows of cassava leaves and other leguminous fodder and explained the elements of the ruminants' digestive system. At the rainfed site where mungbeans are proposed to be grown before and after rice, the women were taught how to dry mungbean hay as fodder since they participate in harvesting and threshing.

Responding to the problems in swine production enumerated by women, an swine production specialist from the Institute of Animal Science visited both sites and explained the importance of improving the quality rather than the quantity and frequency in swine feeding programs. The importance of proper nutrition and disease control were also discussed.

Recognizing the importance of women in the dissemination of technology, greater attention was given to explaining the details of the technology. An example is the breeding intervention program, where detection of estrus as well as maintaining the health of the animals is crucial for the success. In a class conducted by the animal breeder at the irrigated site, women were also invited. Teaching women the technique to detect estrus, how to monitor estrus cycles and to detect animal illnesses will strengthen the artificial insemination program. When interviewed, women who attended the class indicated they know nothing about detecting estrus in large animals but did for swine. Many misconceptions pertaining to the impact of artificial insemination on size of offspring were clarified. Provision of technical knowledge to farmers including women involved in rice production was given priority attention. A 2-day class in rice production was held at the field office by the Ministry of Agriculture staff assigned to the site. The importance of using farm yard manure as compost was also stressed.

b) Testing glutinous rice varieties

Since processing and marketing glutinous rice is an important income generating activity for women in Carusucan, particularly during the dry months, improvements in the existing glutinous rice production techniques were investigated by the FSR team.

During a Crop-Livestock planning workshop in 1986, it was proposed that IR-65, a high yielding, early maturing glutinous rice variety be included in the component technology trials in Carusucan. The previous component technology trials included only high yielding varieties such as IR60, IR64 and other new varieties. IR65 matures in 114.5 days with a potential grain yield of 5 t/ha. while local glutinous rice mature in 130 to 140 days with a grain yield of 3 t/ha. During the 1986 cropping season, 21 farmers (crop livestock cooperators and non-cooperators) were selected to test IR-65 and Local varieties such as "Waray", "Diket" and "Milagrosa", using farmers' inputs and management. The data show that the average yield (fresh wt.) of IR65 is 16% higher than the local glutinous rice varieties (Table 14). The farmers mentioned the characteristics such as early maturity, better tillering capacity, higher yields, uniform plant height, resistance to lodging, pests and diseases and better grain quality as advantages of IR65 over the local varieties.

Another advantage which the farmers found in growing IR65 is that the early maturity date (two weeks earlier than local varieties) enables them to generate cash during the lean months before harvesting the main rice crop. Some agronomic characteristics of IR65 and local varieties obtained from farmers' fields were compared (Table 15). In terms of eating quality, IR65 is sticky and tacky but does not have the aroma which makes the "Milagrosa" fancy variety more preferred. The local variety has round

grains while IR65 has fine elongated grains which makes hulling by hand difficult. Acceptance of IR65 has been encouraging. Farmers from the other villages who learned of IR65 bought seeds from the farmers who tested the variety. Some farmers in the irrigated site asked for seeds to be tested during the dry season. The farmers now refer to IR65 as "Cory" to differentiate it from the local variety called "Imelda". Further component technology trials involving UPLB glutinous rice varieties will be tested further.

c) Developing cooking devices for processing glutinous rice.

Because processing of glutinous rice is very tedious, time consuming and inefficient, engineers from the Agricultural Engineering Department (through Dr. Yong Woon Jeon, Mr. Bautista and Ms. Leonides Halos) were invited to see in what ways they could improve existing processing practices. After a series of visits, discussions with village women and men and watching the actual process, they developed two simple designs for processing glutinous rice: an improvised cooking pan with a rotating wooden paddle (Fig. 5) and a small portable dehuller which reduces the hand labor in dehulling (Fig. 6). The dehuller is made of wood and hard rubber which can dehull 12 kgs or 1 can of glutinous rice in only 20 minutes. Using the improvised cooking pan with a rotary paddle allows close regulation of mixing. Puffing of the rice is avoided for higher hulling recovery. After the engineers designed these devices, a farmer-carpenter was invited from the site to test the devices at IRRI. Following the recommendations of the farmer, the clearance of the dehuller is to be adjusted. Since drying after parboiling is the most time and fuel consuming element of the process, an alternative is to use an IRRI designed flash dryer with substantial capacity. Volume wise this may turn out to be more efficient. The farmer-carpenter returned to the village and discussed the newly designed cooking devices and the dryer. The farmers indicated they are willing to invest in an inexpensive version of the flash dryer. This design further be tested at the site during the next cropping season. The high yielding glutinous rice, enhanced cooking and dehulling devices may enable women to earn more household income.

d) Training in mushroom production

To demonstrate opportunities for increasing income and diversifying income sources twenty women from both research sites were given "hands on" training through the "Prosperity Through Rice Project at IRRI". Oral tests were given to check the degree to which they understood and retained information. Technical terms like mycelium, inoculum, culture medium etc. have now been familiar to them. Two women researchers interpreted most of the lectures in the native dialect. For each material used in the laboratory, the women thought of inexpensive, readily available substitutes obtainable in the village. Upon returning the village, they tried what

they have learned during the training course. They successfully produced their own mushroom spawn using indigenous materials and have used the mushroom they produced for home consumption. The production of *Volvarellia* mushroom using rice straw as a substrate had contamination problems. To minimize this problem, a small, portable inoculum chamber made of wood was made by a farmer-carpenter. To sustain their enthusiasm, selected women were brought to a nearby village which grew mushroom commercially. They were able to interview women in the area who are now deriving their income as mushroom planters. There is a strong market for mushroom not only in Urdaneta but also in Manila. Buyers even place advance orders because of the lack of mushroom supply. Trained women are still attempting to perfect the *Volvarellia* mushroom production using the inoculum chamber.

e) Introducing the Farmer's Primer in Growing Rice

In cooperation with the IRRI Communications and Publications Department, the Pangasinense translation of the Farmers' Primer on Growing Rice was introduced to farmers in Malanay. The Primer was tested on both men and women involved in rice farming to assess their benchmark technical knowledge and also to evaluate the effectiveness of the Primer in introducing rice technology. Based on these results, revisions will be made to make the Primer more useful and effective to the farmers, both men and women. Introducing the Farmers' Primer to women as well as men, was recommended in a study conducted by the Communications and Publications Department (Cabanilla, 1986). The study revealed that wives of farmer respondents read the Primer at least as comprehensively as did the husbands.

h) Monitoring household data

Economists from the Ministry of Agriculture are collecting labor data on crop and livestock (for large animals only) activities from household-cooperators of both sites. This data are disaggregated by sex and source. Disaggregating labor data by gender is part of the routine in data collection at sites. Along with these action research activities, two female field workers stationed at each site are collecting weekly household data which include labor, income, expenditures, credit and monthly rice purchases throughout the cropping season from selected household (female heads, landless and cooperators of the project) in both research sites. These information will be used to examine the possible effects of technologies (crop, livestock) on the intrahousehold allocation of resources and the decision-making patterns of the household members, particularly of women. Income sources from farm, off-farm and non-farm sources by week are disaggregated by sex. These information displays the contribution of household members (particularly of women) to total income and whether income increases following adoption of the technologies. The credit schedule includes information on the date loans were borrowed, amount

borrowed, date of maturity, source, purpose, collateral used, interest rate, credit arrangements, repayments and the name of borrower. Data from the survey will be used to test the hypothesis that there is gender differential access to both formal and informal credit. Food consumption of the household were also gathered.

Case studies on women's work and child care are being conducted in Carusucan as part of a research project entitled "Women's Work Support Systems: Focus on Child Care Support Structure". This is in collaboration with FILIPINA, a non-profit women's organization.

i) Organizing farmers' association

In compliance with farmers' request in the rainfed site for the research team to help them organize, the sociologist helped them organize an association composed of men and women cooperators. A farmers' organization is quite important in promoting and sustaining adopted technologies for the community. The suggestion to include farmers' wives came from the farmers themselves. Three women members were elected as officers. At present, four women farmers in Carusucan are active members of the "Samahang Nayon". In Malanay, there are no women associations and the farmers organization are all composed of men.

VI. Summary

This report describes on-going activities under the women and technology development component of the Women in Rice Farming Systems program. The preliminary results demonstrate that addressing the needs of women does not require a separate women's project. Integration of women's concerns into the design and dissemination process of the crop-livestock project in Sta. Barbara has proven to be an efficient and effective mechanism. The farming systems methodology first describes existing farming systems (including analysis of the specific roles of men and women in production as well as decision-making activities), constraints to production and processing are identified, and existing, emerging and future technology options (particularly for women) are reviewed, and promising technologies are then tested by users. This methodology is generalizable and can be replicated in other farming systems sites.

At these two research sites, men are involved primarily in production activities while women handle processing and marketing. Several promising technologies, including varietal improvements (IR65 vs. local varieties), agricultural machinery (equipment for dehulling and pro-cessing glutinous rice) and biomass utilization using rice straw as the substrate for mushroom production), were introduced and tested. To complement these technologies, technical knowledge and skills were introduced to both men

and women. Farmer classes were conducted, the "Farmer's Primer" was distributed, hands-on training in mushroom production was provided for women and several educational field trips were arranged.

One year of experience with this prototype project have provided a number of important insights:

- a) The need for an initial, comprehensive description of the farming system focusing on the differential role men and women assume in activities.
- b) Biological scientists must target women's needs during the technology design phase. There are few readily usable technologies which specifically address the needs of women in rice farming systems. Social scientists can assist by providing timely, reliable data describing the role and needs of women.
- c) Research staff must spend time in the field to clarify farmers' problems and assess alternative solutions.
- d) Social and biological scientists must interact more to create an effective environment for productive, relevant research.

Future action research

There exist many technologies which are potentially usable by women which can be tested within the farming systems framework. These include techniques for:

- a) seed production and management

Seed sourcing and distribution is normally handled on a farmer-to-farmer basis rather than tapping certified sources. Unfortunately, locally procured rice seed is often too expensive, of poor quality or contains mixtures. Estimates of the yield reduction attributable to poor seed range from 12 -20%. Seed storage and preservation are normally a women's responsibility, thus women's skills and labor can determine seed quality. There appears to be considerable scope for improving seed viability through better management and storage. We feel women can be trained in modern techniques of seed selection, production, management and preservation.

Research and training techniques of this type might be developed by IRRI, and propagated through national seed growers associations and other groups interested in enhancing the quality of seed.

- b) Integrated Pest Management

Women can readily be trained in the techniques of integrated pest

management (IPM). A prototype IPM field project is now underway in Calamba, Laguna to verify and generate location-specific pest thresholds in rice. Various methods are used to communicate the IPM concept to both men and women. Women are observed to perform supervisory and field monitoring functions very effectively. The IPM concept can also be used in mungbean growing areas where insect infestation is a major problem. Since women already handle much of the crop care, harvesting and threshing activities, they could easily be trained to employ IPM techniques for mungbean production.

c) "Tapak-Tapak" irrigation system

The tapak-tapak is a treadle powered, medium-lift irrigation pump which can easily be operated by women. This low cost technology permits growing of a second vegetable crop during the dry season in areas which have no gravity irrigation water available.

d) Charcoal briquettes

Rice husk is commonly used for fuel in rural households but is not always available during the rainy season and is a dirty fuel which is difficult and expensive to transport. Charcoal produced from partially combusted rice husks is a promising technology which produces a low-cost, clean burning fuel very suitable for household storage and use. Although women would not necessarily be involved in the production of rice husk charcoal, they would be a primary beneficiary from use of this technology.

e) Composting

Women already collect farmyard manure for fuel. With the provision of alternative fuel sources, such as rice husk charcoal, these organic fertilizers become available for use in crop production. Training and demonstration in the proper production of compost fertilizer would complement activities presently being handled by women and increase the productivity of backyard vegetable production.

f) Pedal threshing

Rice threshing is often delayed awaiting arrival of contract threshing machines. A light, low-cost thresher suitable for manual operation by women would improve the timeliness and yield of the crop and release men for nonfarm activities.

The above list is not comprehensive but is indicative of the types of technology which can be integrated into rice-based farming systems and which raise income by increasing productivity and adding value to products of the farming system.

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Table 1 . Demographic indicators of Malanay and Carusucan site,
Sta. Barbara, Pangasinan.

Parameters	Malanay (irrigated)	Carusucan (rainfed)
Total no. of households	229 (100.0)	144 (100.0)
With land	123 (53.7)	113 (78.5)
Without land	106 (46.3)	31 (21.5)
Total land area (km ²)	1.18	1.42
Population density (persons/km ²)	1291	598

Source: 1985 Survey.

Table 2. Demographic indicators of Malanay and Carusucan sites, Sta.Barbara Pangasinan.

Parameters	Malanay (irrigated)			Carusucan (rainfed)		
	Male	Female	% of total	Male	Female	% of total
Population distribution						
0-14 yrs. old	363 (52.6)	327 (47.4)	45.3	226 (56.6)	173 (43.4)	47.2
15-64 yrs. old	379 (49.4)	388 (50.6)	50.4	207 (50.6)	202 (49.4)	48.4
65 and above	34 (51.5)	32 (48.5)	4.3	21 (51.4)	20 (48.6)	4.8
Total population	776 (51.0)	747 (49.0)	100.0	456 (53.7)	393 (46.3)	100.0

^a Figures in parentheses are percentages of columns.

Source: Survey, 1985.

Table 3. Levels of education of adults (15 years and above) of total population, Sta. Barbara, Pangasinan

Educational attainment	Malanay (irrigated)			Carusucan (rainfed)		
	M	F	% of total	M	F	% of total
No schooling	6 (30.0)	14 (70.0)	2.0	14 (58.0)	10 (42.0)	5.0
Elementary	81 (48.4)	193 (52.0)	45.0	107 (52.0)	97 (48.0)	45.0
High school	172 (56.0)	137 (44.0)	37.0	82 (46.0)	97 (54.0)	40.0
College	54 (42.0)	76 (58.0)	16.0	25 (58.0)	18 (40.0)	10.0
Total	413 (49.6)	420 (50.4)	100.0	228 (51.0)	222 (49.0)	100.0

^aFigures in parentheses are percentages of columns

Source: Survey, 1985.

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Table 4. Household characteristics, Carusucan and Malanay,
Sta. Barbara, Pangasinan

	Malanay (irrigated)	Carusucan (rainfed)
	(n=20)	(n=18)
Age: Operator	44	45
Wife	41	43
Years in school		
Operator	6	5
Wife	6	5
Farming experience of		
Operator	23	16
Household members		
Number	7	6
Working in farms	4	3
Labor source in rice production (%)		
Family (male)	49	56
(female)	3	8
Hired (male)	35	12
(female)	9	5
Exchange (maie)	3	15
(female)	1	4
Total (male)	87	83
Total (female)	13	17

Source: Ministry of Agriculture, Crop and Livestock Project,
Sta. Barbara, Pangasinan.

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Table 5. Farm characteristics, Malanay and Carusucan, Sta. Barbara, Pangasinan

Items	Malanay (Irrigated)	Carusucan (rainfed)
% area planted to:		
HYV-HYV	69	-
HYV-fallow	20	69
HYV-mung (local)	4	12
Glutinous rice fallow	-	9
Others	7	10
Most common HYV grown	IR-42	IR-42
Average yields (t/ha)	4.3	2.9
Levels of fertilizer use (kgN/ha)	80-100	30-40
Average landholding (ha)	1.92	1.19
Land tenure		
% of cropland under ownership	1	3
Share tenancy	39	71
Leasehold	60	26
Animal-land ratio (A.U/ha)	1:2.1	1:1.2
Gross income (₱/yr)	5,000	3,000

Source: Ministry of Agriculture, Crop-Livestock Project, Sta. Barbara, Pangasinan, 1985.

Table 6. Labor participation in crop activities of farming and landless households, Carusucan, Sta. Barbara, Pangasinan, 1985.

Crop /Activity	Farming household		Landless households	
	Male	Female	Male	Female
			(%)	
Rice				
Land preparation	95	5	100	0
Pulling of seedling	6	94	9	91
Transplanting	98	2	100	0
Harvesting	76	24	69	31
Threshing	94	6	83	17
Buying inputs	82	18		
Taking palay to mills	56	44	100	0
Marketing	69	31	100	0
Glutinous rice				
Cooking	36	64	50	50
Pounding	71	29	59	41
Marketing	14	86		100
Mungbean				
Broadcasting	17	83	-	-
Harvesting	57	43	53	47
Threshing	42	58	53	47
Marketing	36	64	0	100
Buying inputs	79	21		
Vegetables (farm)				
Growing	79	21		
Selling	42	58	0	
Total households interviewed				
	69			26

Source: Census of total households, 1985.

Table 7. Labor participation in crop activities of men and women of farming and landless households, Malanay, Sta. Barbara, Pangasinan.

Crop/Activity	Farming households		Landless households	
	Male	Female	Male	Female
	(%)			
Rice				
Land preparation	100	-	100	-
Pulling of seedlings	15	85	19	81
Transplanting	95	5	94	6
Harvesting	68	32	71	29
Threshing	76	24	74	36
Buying inputs	80	20	-	-
Taking palay to mills	46	54	60	40
Marketing	56	44	-	-
Mungbean				
Broadcasting	33	67	-	-
Harvesting	64	36	50	50
Threshing	33	67	-	-
Marketing	40	60	-	-
Buying inputs	81	19	-	-
Vegetables				
Growing	75	25	-	-
Selling	26	74	-	-
Total households interviewed	100		51	

Source: Census of total households, 1985.

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Table 8. Percentage of total individuals in a household involved in carabao and cattle care production, by type of activity, Malanay, Sta. Barbara, Pangasinan, 1986.

ACTIVITY	ADULT		CHILD ^b	
	-----		-----	
	Male	Female ^a	Male	Female
Gathering rice straw	74	63	26	0
Stacking rice straw	89	37	32	0
Gathering weeds	79	53	37	0
Gathering Leucaena leaves	11	53	11	0
Gathering sugarcane tops	47	11	16	0
Giving rice bran	37	47	11	0
Feeding	79	84	37	0
Giving water	68	74	37	0
Grazing	79	68	32	0
Putting up animal shelter	84	16	16	0
Cleaning pen	79	74	32	0
Bathing	79	42	37	0
Detecting estrus	74	4	0	0
Taking animal for breeding	58	0	0	0
Buying/selling animal	47	21	0	0

^a Two of the households are headed by women (widows)

^b Age 7 - 15 years old.

n = 19

Table 9. Percentage of total individuals of the selected households, involved in carabao and cattle production, by type of activity and labor source, Carusucan, Sta. Barbara, Pangasinan, 1986.

ACTIVITY	b			
	ADULT		CHILD	
	Male	Female ^a	Male	Female
Gathering rice straw	83	94	44	0
Stacking rice straw	83	28	44	0
Gathering weeds	83	89	39	0
Gathering Leucaena leaves	33	56	17	0
Gathering mungbean fodder	28	33	17	0
Gathering acacia leaves	17	11	0	0
Gathering corn stover	11	6	0	0
Giving rice bran	56	72	11	6
Feeding	78	89	50	6
Giving water	83	78	39	6
Grazing	72	89	56	0
Putting up animal shelter	61	6	6	0
Cleaning pen	56	72	33	0
Bathing	83	94	33	11
Collecting dung	0	28	0	0
Detecting estrus	39	6	0	0
Taking animal for breeding	8	6	0	0
Buying/selling animal	78	17	0	0

a

Two of the households are headed by women (widows).

b

Age 7-15 years old.

n = 18.

Table 10. Percentage of total individuals of the selected households involved in swine production, by type of activity and labor source, Malanay and Carusucan, Sta. Barbara, Pangasinan, 1986.

ACTIVITY	Malanay				Carusucan			
	AM	AF (n=18)	CM	CF	AM	AF	CM	CF (n=19)
Gathering swamp cabbage	6	47	0	6	56	89	11	11
Gathering/giving Leucaena	0	47	0	0	6	72	0	0
Feeding starter	0	53	0	0	0	61	0	0
Feeding rice bran	0	100	0	0	0	94	0	0
Buying rice bran	0	26	0	0	0	56	0	0
Cooking/feeding rice porridge	0	11	0	0	0	22	0	0
Gathering/grating banana stumps/stalks	11	26	0	0	6	33	0	0
Putting up shelter	79	0	0	0	89	0	0	0
Cleaning the pen	16	100	0	0	22	94	6	11
Bathing/ fetching water/ giving water	11	100	0	0	17	100	6	0
Detecting illness	0	100	0	0	0	100	0	0
Buying/giving medicine	0	79	0	0	0	61	0	0
Applying traditional cure for illness	0	26	0	0	0	17	0	0
Detecting estrus	0	74	0	0	0	83	0	0
Taking sow for breeding	0	53	0	0	6	78	0	0
Castrating	0	0	0	0	0	17	0	0
Buying/selling/pricing	0	100	0	0	0	100	0	0

The abbreviations stand for the following:

- AM - male adult
- AF - female adult
- CM - male child
- CF - female child

Table 11. Total time spent in processing glutinous rice, Carusucan, Sta. Barbara, Pangasinan, 1986.

Activity	Family			Hired			% of Total		
	Male	Female	Children	Male	Female	Children	Male	Female	Children
	(mhrs)								
Cooking	54.0	85.0			3.0		38.0	62.0	
Pounding	23.0	23.0	10.0	6.0		4.0	43.9	34.9	21.2
Adding charcoal	15.7	25.8	7.0	.8			33.0	52.0	14.0
Winnowing	1.0	21.5			.5		4.4	95.6	
Total	93.7	155.3	17.0	6.8	3.5	4.0	35.9	56.6	7.5

n = 13 households

Table 12. Costs and returns of processing glutinous rice
Carusucan, Sta. Barbara, Pangasinan, 1986 (P)

Gross returns (A)	
174 kgs. at P 12.50/kg. (processed)	P 2175.00
Cash costs	
348 kgs. at P 2.92/kg. (unprocessed)	1016.16
Basin	45.00
Fuel	50.00
Transportation	80.00
Others	26.00

Total cash costs (B)	1217.16
Net Returns (A-B)	957.84
Cost of processing/selling/kg. (B/174)	7.00
Net returns/kg. (A-B)/174)	5.51
Rate of returns to capital (5.51/6.99)	.79*

n = 54 interviewed who are involved in processing and selling
glutinous rice.

* For every peso invested P1.79 can be earned.

Table 13. Income of farm households by source, by location, Sta. Barbara, Pangasinan, January-December, 1986.

Income source	Malanay (irrigated)	%	Carusucan (rainfed)	%
Own-farm (P)				
Crops	5451	40.4	3057	19.0
Livestock	2404	17.8	2293	21.7
Others	618	4.6	353	3.3
Sub-total	8473		5703	
Off-farm				
Male wages	871	6.4	240	2.2
Female wages	281	2.2	124	1.2
Both	149	1.1	-	
Sub-total	1301		364	
Non-farm				
Remittances	716	5.3	1804	17.1
Other business/lottery	1530	11.3	388	3.7
Male (non-farm)	1248	9.3	873	8.3
Female (non-farm)	213	1.6	1424	13.5
TOTAL INCOME	13481	100.0	10556	100.0
No. of households	18		17	

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Table 14. Costs and returns of glutinous rice varieties,
Carusucan, Sta. Barbara (rainfed site) 1986

Items	IR65	Local
Yield (kg/ha) fresh wt.	5,420	4,680
Price/kilo (₱/kg)	2.92	2.92
Gross returns (A) (₱/ha)	15,826	13,666
Labor and power costs (B)	4,949	4,372
Land preparation	1,161	1,023
Crop establishment	575	569
Weed control	1	6
Fertilizer application	14	11
Insecticide application	2	2
Other care	31	28
Harvesting	3,165	2,733
Material costs (C)	797	607
Seeds	343	119
Fertilizer	425	419
Insecticides	29	63
Others	-	6
Total variable costs (D)	5,746	4,979
Returns above variable costs (A/D)	10,080	8,687
Returns to labor and power costs: $\frac{(A - C)}{B}$	3.04	2.59
Returns to material costs: $\frac{(A - B)}{C}$	13.65	15.31
No. of plots	22	22
Ave. plot size (M ²)	429.79	645.56

SOURCE: Ministry of Agriculture, Crop-Livestock Project,
Sta. Barbara, Pangasinan, July-Dec. 1986.

Table 15. Agronomic characteristics of glutinous rice varieties, farmers' fields, Carusuras, Sta. Barbara, Pangasinan, 1986.

Varities	Ht. (cm)	Maturity (days)	Panicle length	% Filled (Grains)	PT ^a Hill	Wt. of 100 seeds Fresh	Dry
IR65	89	120	22	77	11	3.2	2.5
Imelda	102	130	24	75	10	3.8	3.2
Miracle	80	130	21	76	10	3.3	2.8
Milagrosa	136	130	24	89	7	3.7	2.8
Waray	111	150	26	62	9	3.7	3.2

^a Productive tillers/hill.

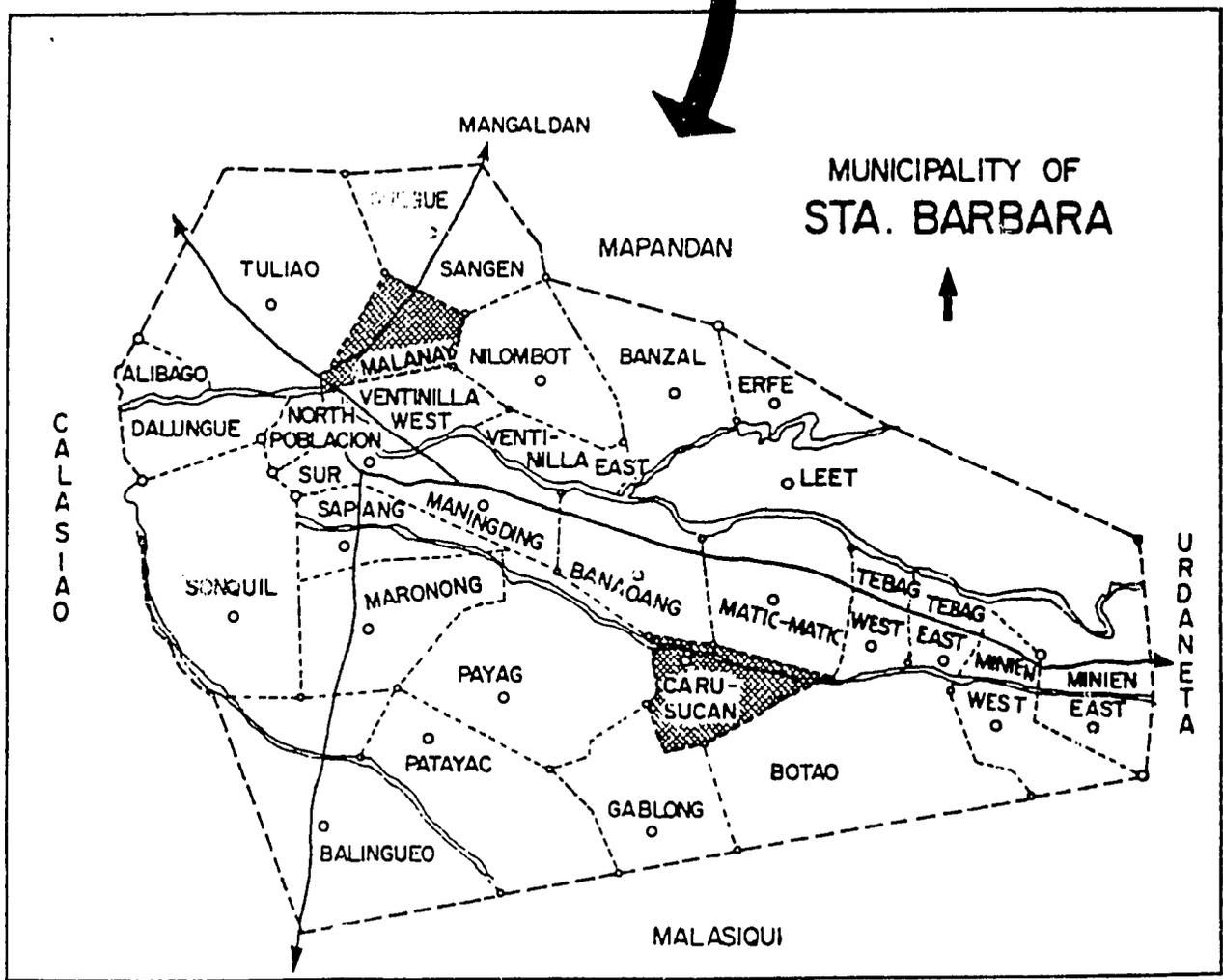
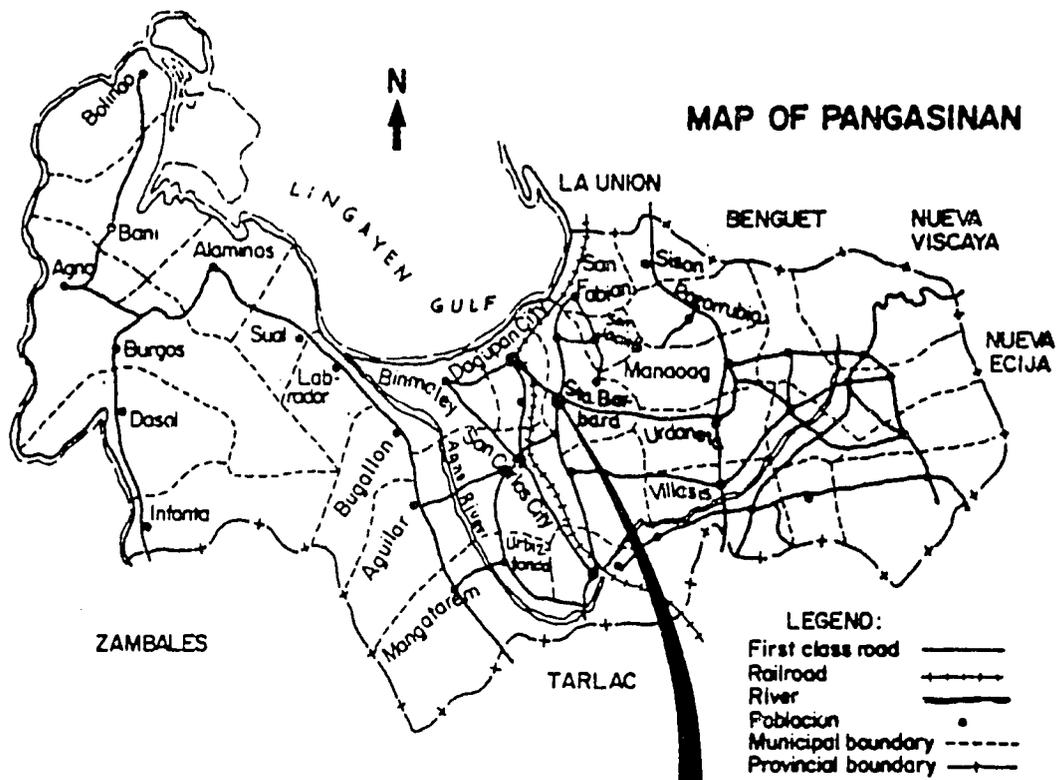


Fig. 1. Map of farming system site in Sta. Barbara, Pangasinan .

as.

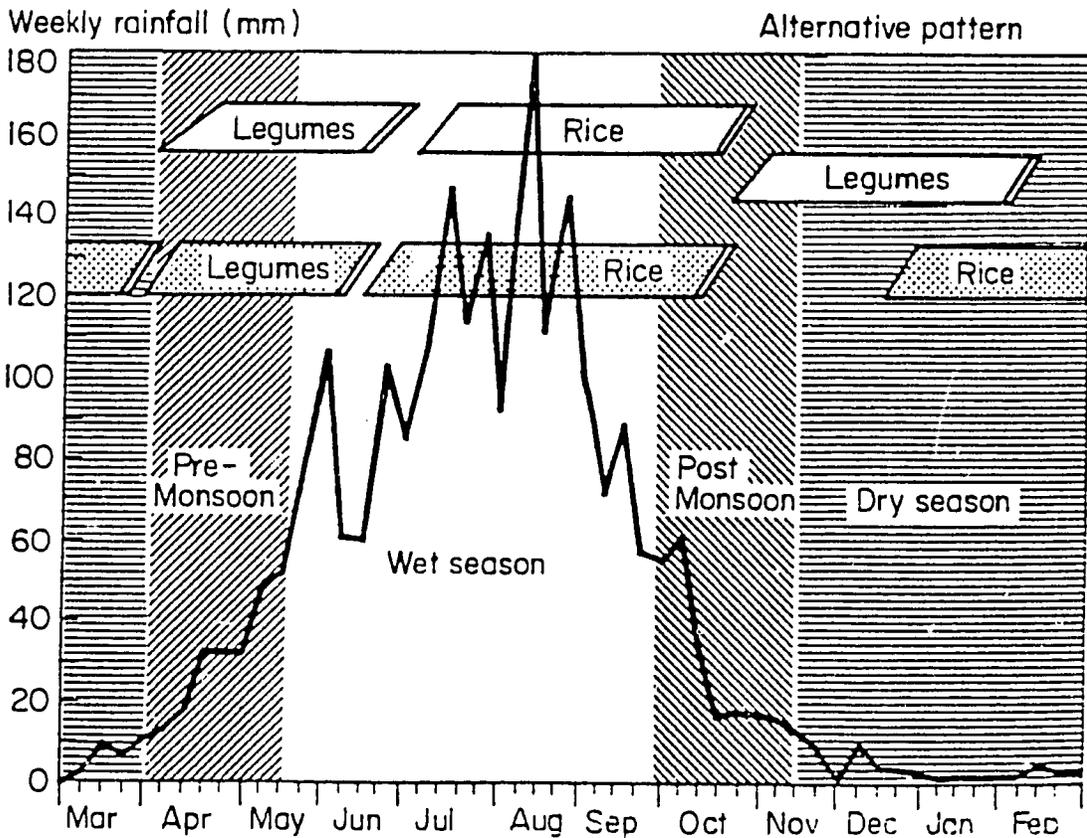
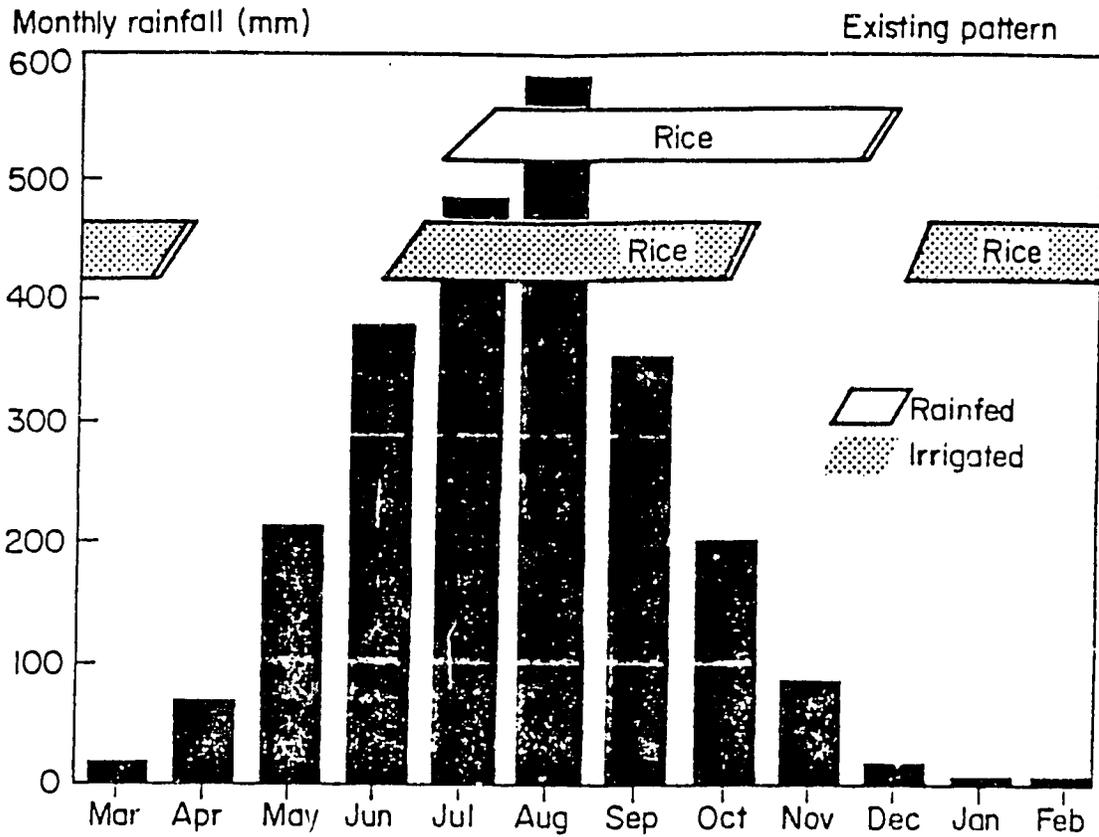


Fig. 2. Average monthly and weekly rainfall distribution (34 years), crop-livestock research station, Pangasinan, Philippines

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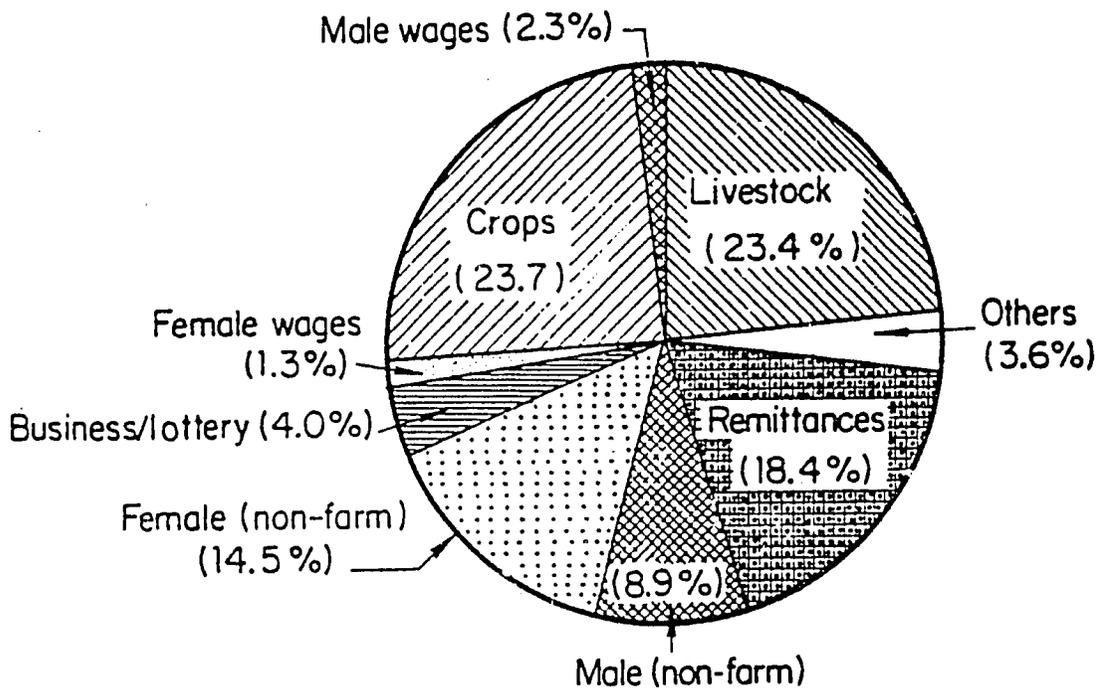


Fig. 3. Income sources in Carusucan, rainfed site, Sta. Barbara, Pangasinan, Jan.-Dec. 1986.

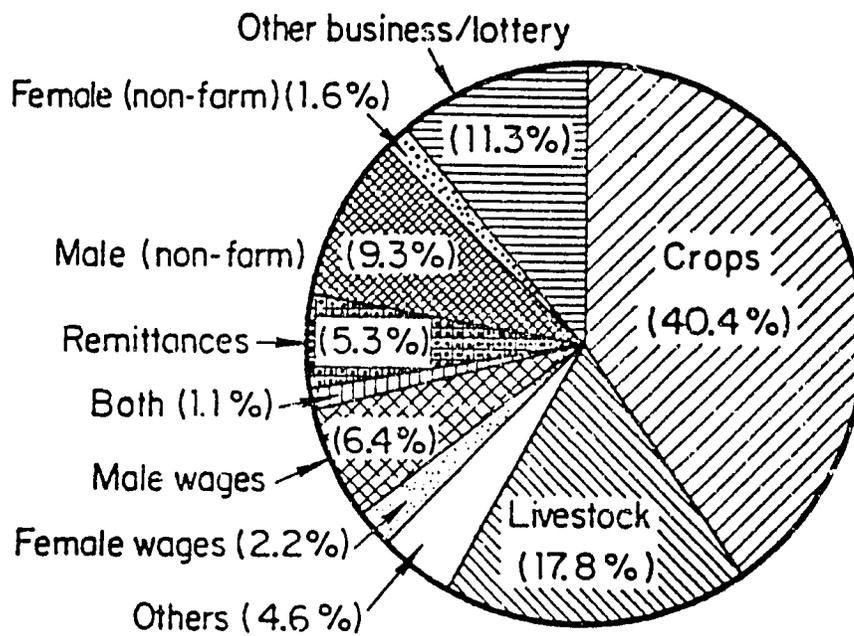


Fig. 4 Income sources in Malanay, irrigated site, Sta. Barbara, Pangasinan, Jan.-Dec., 1986.

CB



Fig. 5. Existing and proposed innovation of cooking glutinous rice at the rainfed site.

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Fig. 6. Existing and proposed innovation of dehulling glutinous rice at the rainfed site.

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Appendix III

THE INTERNATIONAL RICE RESEARCH INSTITUTE

MEMORANDUM

June 9, 1987

To: WIRFS Advisory Committee

From: B. Duff

Topic: IRRI External Program Review Report

The Institute recently underwent an external program review in which research programs were examined in detail. The attached materials contain the review panel's findings and recommendations relating to WIRFS activities. These comments are very positive and provide a strong endorsement for continuation and strengthening of WIRFS work. Conversely, the recommendations place a high level of expectation on future activities. For this reason, planning for the next five years must be done with care and realism.

CHAPTER 3. IRRI'S APPROACH TO GENDER QUESTIONS

The second quinquennial review did not discuss the "gender issue." Since that time, the gender issue or questions about the role of women and the returns to women working in agriculture have become an increasingly important item on the development agenda. Much of the attention has been, and continues to be, on the impact of technological change on the welfare of women. Since IRRI is concerned with technological change in rice production - an activity that employs many millions of women - it is clear that IRRI has every reason to be concerned about the "gender question". IRRI has recognized this. As early as 1979, a few IRRI studies deliberately gathered data on the role of women in rice production. It was in 1983, though, that IRRI first gave explicit attention to evaluating the role of women in rice farming systems by convening a conference of biological scientists, social scientists, and policy makers to discuss, inter alia, how women might benefit more from emerging technologies.

In March 1985, IRRI joined the International Service for National Agricultural Research (ISNAR) to host an inter-center conference in Bellagio at which there was considerable discussion among the participants about the impact of the research programs of the CGIAR Centers on the welfare of women. It was emphasized that the neglect of attention to women leads to inefficient technology development and transfer programs - in those cases where the users are women - and that new technologies can well have negative consequences for women. It was agreed that the CGIAR Centers and national agricultural research systems should develop long-term strategies to take the role of women into account - where possible - in all phases of research and technology development work. Finally, in April 1985, a project design workshop was held at IRRI as a follow-up to the Bellagio meeting. It was proposed that IRRI organize a collaborative effort and undertake action/research projects in five general areas:

- (i) women and technology development - to integrate the concept of women's various roles within the household and the farm into farming systems research;
- (ii) women and extension - to include women in various extension programs dealing with agricultural technology development;
- (iii) impact of technologies on women and the household - to evaluate the effects of technologies on women and children, including socio-cultural, institutional, and economic considerations;
- (iv) complementary studies - to include studies such as the dynamics of household behaviour; the functioning of rural labour markets; and the policy environment which affects farm and household decisions;

- (v) sensitization - to "synthesize" relevant experience, data, and analysis generated from projects of this network (Women in Rice Farming Systems) and elsewhere to sensitize agricultural scientists, policy-makers, development administrators, farmers, and women themselves.

The ultimate aim of this collaborative work is to institutionalize women's concerns within agricultural research and extension programs on rice farming systems. Hopefully, this will be achieved by:

- (i) incorporating rural women's concerns into on-going programs, both in IRRI's outreach programs and at IRRI itself;
- (ii) stimulating interest in Women in Rice Farming Systems (WIRFS) research in the national agricultural research systems, in non-specialist universities, national development research institutions, and in non-government organizations; and
- (iii) establishing a network to promote a concern for WIRFS under the Asian Rice Farming Systems Network (ARFSN).

IRRI has been a leader among the International Agricultural Research Centers in incorporating women's issues into the agricultural research process. Nonetheless, this effort is still a modest and somewhat compartmentalized effort rather than an Institute-wide effort.

3.1. IRRI's Program on Women in Rice Farming

IRRI has initiated project work that deals specifically with women in rice production and processing. The project is a collaborative venture with the University of the Philippines at Los Banos (UPLB) and IRRI's Rice Farming Systems Program and Department of Agricultural Economics, and is a component of the Farming Systems program. The project first involved selecting several villages in the Philippines for an analysis of specific ways and means whereby women's productivity and incomes could be enhanced. Some opportunities have been identified - such as the introduction of mushroom farming and improved techniques for processing foods sold at certain seasons of the year. Further opportunities related to women's role in rice production are being examined in such activities as seed selection, integrated pest management, low cost irrigation pumps, pedal threshing, and paper making from rice straw.

During the past year, some experience in analysis techniques has been gained in farming systems research that can help determine further opportunities for gender-specific improvements. In the coming years, it is planned to extend the program to neighbouring countries as part of the expanded farming systems network; much of the expanded program will be based on the techniques developed within the first phase of this project.

Other facets of IRRI's programs bear directly on women's role in rice production. The "Prosperity through Rice" project, which attempts to find ways of using the whole rice plant (including straw and other by-products), is also expected to lead to expanded opportunities for women to raise their incomes. At a different level, the on-going macroeconomic and microeconomic research on the "livelihood impact" of the direct and indirect consequences of new rice technologies in a number of contexts. This macroeconomic analysis will, for example, attempt to develop methodologies to determine the overall effects of changes in the labour market, including the impact on women; the microeconomic analysis will focus at the village as part of the farming system.

3.2. Women in Research and Management of IRRI

The Board of Trustees of IRRI consists of 15 members, of whom two are women. No other CGIAR Center has more. Between 3% and 5% of the senior scientific posts are occupied by women.

IRRI's training programs provide training and fellowships for men and women. In 1986, around 30% of the research fellows and 20% of the non-degree trainees were women (Table 2). These are impressive numbers that augur well for an increase in the number of women professionals in rice-related activities.

Table 2. Numbers of male and female scholars, by region and type of training at IRRI in 1986

Region	Male	Female	Total
A. Post-doctoral fellows			
Asia/Pacific	18	3	21
North Africa/Near East	1	0	1
Sub-Saharan Africa	2	0	0
Developed countries	3	1	4
Total	24	4	28
B. Ph.D. and M.Sc. candidates			
Asia/Pacific	34	16	50
Sub-Saharan Africa	2	2	4
Latin America & Caribbean	1	1	2
Developed countries	6	2	8
C. Short-term trainees			
Asia/Pacific	262	43	305
North Africa/Near East	3	1	4
Sub-Saharan Africa	16	3	19
Latin America and Caribbean	7	1	8
Total	288	48	336
GRAND TOTAL	355	73	428

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3.3. Assessment

IRRI is ahead of many other CGIAR Centers in focussing on gender questions. It is to be commended for its initiatives; it is expected that there will be a much greater understanding of the impact of technological change in rice production on women's welfare and a greater appreciation of the "trade offs" between some of IRRI's technological innovations (e.g. direct seeding) and the opportunities for women. It is also expected that IRRI's pilot effort will show ways and means whereby women's incomes can be enhanced. However, there are other important opportunities for IRRI to demonstrate its concern for and commitment to raising incomes for women in agriculture on a broader basis. For example, IRRI conducts a substantial number of training courses, many of which are for extension agents. Steps should be taken to build into these courses more information about the importance of gender-specific issues in rice production and the need and importance of addressing these issues. Special course material should be developed for this purpose; such material could also address methods whereby women could be reached as groups.

IRRI's response to questions related to gender are still somewhat tentative and its activities have not been without opposition in a largely male dominated organization. The management is to be given credit for initiating programs to take into account the fact that women do much of the work in rice production in Asia - as is attested to by IRRI's own logo. It is expected that this effort will expand through the "hands on" and socio-economic research and training programs outlined at the Bellagio meeting, as discussed earlier.

DR. MONKOMBU SAMBASIVAN SWAMINATHAN

An Agricultural Scientist of world repute, Monkombu Sambasivan Swaminathan is currently Director General of International Rice Research Institute (IRRI), Los Banos, Philippines and Independent Chairman of the Governing Council of FAO. Though a specialist in Plant Genetics for which he received many scientific awards including the the Fellowship of Royal Society of London (1973) and the Borlaug Award (1979), his wide ranging interests cover many other aspects of agriculture, forestry, conservation of nature and natural resources, science and technology and the harness of all types of human resources for development. His work in these fields also has received national and International recognition, including the Ramon Magsaysay Award for Community Leadership (1971).

A strong supporter of enhancing women's role in development, he directed the inclusion of a special chapter on Women and Development in India's Sixth Five year Plan, and continued persistent efforts to create awareness of women's actual and potential roles in development among agro-scientists, technologies and policy makers at national, regional, and International levels for which he received the first award instituted by the Association for Women in Development, Washington, D. C. in 1985.

*The Role of Education and Research
in Enhancing Rural Women's
Income and Household
Happiness*

M. S. Swaminathan



CENTRE FOR WOMEN'S DEVELOPMENT STUDIES, NEW DELHI

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The Role of Education and Research
in Enhancing Rural Women's Income
and Household Happiness

FIRST J. P. NAIK MEMORIAL LECTURE

New Delhi, September 11, 1982

M. S. Swaminathan

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NEW DELHI - 110 017

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PREFACE

It is my privilege to introduce to our readers the first J. P. Naik Memorial Lecture on Women's Studies. J. P. Naik was my personal friend for a very long time and helped me and my colleagues on repeated occasions. We worked together on the National Committee on Women's Education in the late fifties, when we found that his concern for women's equality was as strong as ours. When the Committee on the Status of Women in India was appointed, he was one of the first persons that I contacted for help, and the help he gave us was unstinting. He not only helped us in getting a large number of studies done through the intermediacy of the Indian Council of Social Science Research, but he also gave us his own time - as a member of the Education Task Force, as general adviser, as a friend who even helped to find accommodation when we faced an accommodation crisis, and as a person with whom many of my colleagues, and I in particular, could discuss the problems that worried and some times even frightened us on the Committee.

Most Indian scholars in the field of women's studies know of Naik's continued support to the cause of women's equality through the medium of the research programme that initiated in the ICSSR in 1976. But few are aware that he was also one of the architects of the Centre for Women's Development Studies, giving us the courage and the vision to initiate our work when we had no visible source of support. His favourite maxim that helped us through our early period of struggle was "good work that needs to be done never fails for lack of resources, only of determination."

We had hoped to have the benefit of his wisdom, his enormous experience in institution and nation building, and in the promotion of unpopular causes and ideas for a long time, but unfortunately death intervened and took him away on 30th August 1981, just when we needed him most. The institution of this lecture series in his memory was the least that we could do under the circumstances.

Women's studies has multiple objectives, one of which is to sensitise persons in key decision making positions and in planning major areas of enquiry which in course of time helps to improve nation building processes. We could not, therefore, think of a better person than Dr M. S. Swaminathan to deliver the first J. P. Naik Memorial Lecture. As a scientist and policy maker he has proved most sensitive and responsive to the problems of women. We are aware that it was because of his intervention as Deputy Chairman of the Planning Commission of India that the first ever Chapter on Women



DR. M. S. SWAMINATHAN

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and Development made its appearance in the Sixth Five Year Plan. We are very grateful that he accepted our invitation so readily and agreed to come all the way from Manila to deliver the lecture. When we invited him, we did not know that he was going to leave the country. I am happy that his commitment to the memory of J. P. Naik and to the cause of women succeeded in bringing him to Delhi to deliver the lecture in spite of the onerous new responsibilities that he had shouldered in his new assignment.

He could not have chosen a better theme to begin this lecture series. The greatest challenge that stimulated the development of women's studies in India in the 1970s was the discovery of the adverse results of economic and social transformation on the majority of Indian women, which had not been arrested by the Constitutional and legal guarantees of equality. Rural women from the largest section of this group which has not benefitted but, in fact, lost ground in many ways from the process of change including planned attempts at development. This discovery called for substantial reappraisal of our policies for rural development and women's development within that sector. Dr. Swaminathan was also a Member of the National Commission on Agriculture which submitted its report a year after the Report of the Committee on the Status of Women in India. The Report of the National Commission on Agriculture followed up the findings of the Committee on the Status of Women in India by calling for a reappraisal of rural and agricultural development policies so that the major role that rural women play in the economy of our country is acknowledged and regarded as a resource for future development, instead of marginalising this vast human resource. I have repeatedly heard Dr. Swaminathan's statement that our policies for increasing agricultural production and the economic condition of rural households would have succeeded much more if we had sought to enhance women's participation with greater understanding and commitment.

I am sure this lecture will help to stimulate further rethinking and search for improved strategies in this sector, thereby contributing to the basic objective of the Centre for Women's Development Studies.

Centre for Women's Development
Studies, New Delhi, 27th July 1985

Phulrenu Guha

Dr. Phulrenu Guha, Chairperson of the CWDS, was instrumental in the appointment of the Committee on the Status of Women in India in 1971, to investigate the impact of Constitutional equality and planned development on women's status in the country. As Chairperson of this Committee, she was one of the authors of its report - Towards Equality (1975). She was elected to Parliament in the Lok Sabha elections of 1984.

THE ROLE OF EDUCATION AND RESEARCH IN ENHANCING RURAL WOMEN'S INCOME AND HOUSEHOLD HAPPINESS

*" If you are planning one year ahead, plant rice,
If you are planning ten years ahead, plant trees,
If you are planning a hundred years ahead, educate the people".*

—An old Chinese proverb

I first met J. P. in 1964 when he joined as Member-Secretary of the Education Commission (1964-66). He saw in education the pathway to social justice, self-reliance, economic growth, and modernisation of agriculture and industry. What impressed me most in our first meeting was his total dedication to the cause of promoting an open system of education which will offer scope to every child, rich or poor, to develop fully his or her mental potential. He had an open mind as well as infinite patience when it came to hearing others. No wonder the report of the Education Commission contained the stamp of his vision and convictions. For example, his passionate devotion to the cause of introducing flexibility in the educational system to suit diverse economic, ecological, and social conditions is reflected in concepts ranging from the neighbourhood school to the open university.

J. P.'s concern about the high incidence of illiteracy and "drop-outs" and "left-outs" from the education system among the economically and socially handicapped sections of the population led him to conclude that unless education makes sense in economic terms, the situation will not change. Thus he became an ardent advocate of vocationalisation of secondary education. When I was in the Indian Council of Agricultural

Research, he actively participated in work relating to the development of "Krishi Vigyan Kendras", where farmers and fishermen can learn the latest technical skills purely through work experience. In learning by doing, J. P. saw a method of overcoming the handicaps arising from inability to read and write, characteristic of a considerable proportion of small and marginal farmers and landless labour families and more particularly of rural women.

While his contributions to education and national development have been many and varied, J. P. will always be remembered by all who came to know him for his humanism. His conviction that new technology without an understanding of its potential impact on society may become a curse rather than a blessing led to the Indian Council of Agricultural Research and the Indian Council of Social Science Research setting up a Joint Panel to examine the social implications of new farm technology. J. P. felt that social scientists should not just be engaged in studying the causes for the failure of new development projects but should show how to ensure their success. He was a totally positive person, always wanting to do constructive work, rather than spend his time in a cynical analysis of other people's faults and in making doomsday predictions. His great ability to synthesise all the worthwhile points made in any meeting in a lucid and concise manner made him one of the best persons to have as chairman of committees and conferences.

When I called on him a few days prior to his death, he got up from his bed and began to discuss with great feeling the details of a seminar he had planned on the education of children belonging to scheduled castes. He said that what he wanted out of the seminar was not an academic treatise but a practical blueprint for action. Unfortunately, the Seminar

could be held only after his death but I am glad it was conducted in such a way that J. P. would have approved.

When I received the invitation to deliver this lecture, I accepted it immediately because of the opportunity the occasion will provide to recall the message and meaning of J. P.'s life and work. J. P.'s interests were many and varied and picking one theme out of the many with which he was emotionally and intellectually connected, for treatment at this first lecture instituted in his memory became difficult. I finally chose the role of education and research in enhancing rural women's income and thereby the happiness of economically poor households because this is a topic which J. P. and I had discussed on several occasions. Also, it is my conviction that only when women are enabled to participate in an equal measure with men in national development that effective remedies can be found for the major socio-economic maladies facing our country such as rapid population growth, under and mal-nutrition leading to a possible stunting of physical and mental development in children, under and unemployment and extensive eco-destruction.

Women and Development

The VI Five Year Plan (1980-85) includes for the first time in the history of planning in India a separate chapter on "Women and Development." The VI Plan document states "excessive mortality in female children resulting in persistent decline in sex ratio, low rate of literacy and low economic status stress the need for greater attention to the economic emancipation of women." The plan document further states that "the major thrust of the VI plan in the field of welfare of women is their economic upliftment through greater opportunities for salaried, self and wage

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employment. For this purpose, appropriate technologies, services and public policies will be introduced. The technological package will include imparting new skills and upgrading existing skills. The service package will pay attention to training and credit needs and to marketing. The public policy package will include measures in the area of ownership rights, enforcement of wage laws and employment impact assessment with reference to the employment of women in development projects. Women's organisations will be assisted to grow in effectiveness. Specific attention will be paid for the removal of socio-economic biases resulting in the neglect of female children and women. Measures for the improvement of health and nutritional status will be strengthened. Programmes relating to education, health, nutrition and employment would no doubt go a long way in the removal of social disabilities facing women. However, the improvements in the socio-economic status of women would depend to a large extent on the social change in the value system, attitudes and social structure prevailing in the country."

The VI Plan document also mentions "poverty persists under conditions where the human resource is undervalued and material resources are overvalued. The primary objective of planned development should, therefore, be the provision of work opportunities to all. Education, employment and development should become catalysts of each other and should lead to the improvement of the quality of life in both rural and urban areas." How can we give operational content to these sentiments under conditions of widespread indifference and inertia in most government departments as well as in society in general on the whole question of the involvement of women in development?

The analysis made by the Registrar General of the 1981

census data has clearly shown that the only positive correlation observed between success of family planning programmes and any other factor is female literacy. We recognise that population stabilisation is essential for national survival and we know that education of women which is the key to their economic emancipation is a must for this purpose. The available data, however, reveal a sad situation with regard to female literacy. Of the total number of adult illiterates in the country, women constitute the majority. In some States, the female literacy rate is as low as 4% (the corresponding figure for men being 28%). Even in the most progressive States, there is a visible difference. There are sharp differences in the enrolment of girls and boys in elementary school. As many girls in the age group 6 to 14 are out of school as are in.

Averages often hide many ugly facts. If we examine State average literacy rates further, the position is very unsatisfactory with reference to scheduled castes in general and scheduled caste women in particular. There are 46 districts in the country (mainly in Andhra Pradesh, Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh) where the literacy rate among scheduled caste women is less than 1%, going down even to 0.2% in some cases. At every level it seems that girls and women are neglected.

The 35 years since Independence have witnessed a phenomenal growth in facilities for education in the country. Also, several steps have been taken to help the children of economically and socially handicapped sections of the population to derive benefit from the available educational opportunities. Incentives for women teachers, separate facilities for girls, provision of scholarships, books, clothes and midday meals are some examples. High-level committees have been set up from time to time to examine the special needs of first-generation learners and to suggest methods of minimising school

drop-outs and ensure the attainment of the educational goals enshrined in the constitution.

Several innovative educational procedures have been introduced in different parts of the country to meet the needs of special categories of the population. Some examples are the "Meadow School" of Tarabal Modak, the Mobile Schools for children of Gujjars started in Jammu and Kashmir and the whole family educational system introduced for migrant labour by Mobile Crèches. There are numerous examples of this kind in different parts of the country. What we have to learn is the conversion of the unique into the universal. We are yet to institutionalise good and effective approaches and coalesce small droplets of isolated activity into a mass movement.

I. WOMEN AND RURAL DEVELOPMENT

Rural development involves integrated attention to maximising benefits from the developmental assets of the area and minimising the adverse impact of the developmental liabilities. Agriculture, including crop husbandry, animal husbandry, fisheries and forestry, is the most important source of rural income and employment. In its projections on "Agriculture: Toward 2000", FAO makes the following assessment of the current situation in the Third World on the position of women in activities connected with food and agriculture.

"Women play crucial roles in the production, storage and processing of food in most societies. They make up one third of the work force in the developing countries. Women often have well-defined specialisations in food production and are increasingly becoming principal farmers and breadwinners in countries where men migrate in search of work, or where

divorce and separation are common. Fuel gathering, with its potentially devastating impact on the environment that sustains agricultural production, is often a woman's chore.

Despite their importance to agricultural production, women face severe handicaps. They are, in fact, the largest group of landless labourers, with little real security in case of break-up of the family through death or divorce; inheritance laws and customs discriminate against them. Land reform and settlement programmes usually give sole title and hence the security needed for obtaining production credits — to the husband. Agricultural development programmes are usually planned by men and aimed at men. Mechanisation, for example, alleviates the burden of tasks that are traditionally men's responsibility, leaving women's burdens unrelieved or even increased. The excess burden of work on women (the "double day" of the farm work plus house work) also acts as a stimulus to have many children so that they can help out with chores from an early age. Extension workers, almost exclusively male, aim their advice at men and at men's activities and crops. In some regions, this bias may depress production of subsistence food crops (often women's crops) in favour of increased production of cash crops (often men's crops) so that family nutrition suffers.'

All these problems have been known and discussed for a long-time. However, the identification of maladies has seldom been followed by the application of appropriate remedies. There is hence a growing gap between what we know and what we practice. The Department of Science and Technology through the Centre of Science for Villages in Wardha has brought out an excellent compilation of technologies which are available for reducing drudgery and improving productivity in the traditional women's occupations. In a series of articles entitled "Try asking the women first", Dr. Anil Agarwal of the Centre for Science and Development has pointed out with

concrete examples how national programmes in biogas development, social forestry and drinking water supply would have been more successful if women had been involved both in the planning and implementation phases of the concerned projects. The extensive surveys contained in the report of the National Committee on the Status of Women as well as all recent reports, whether it relates to poverty alleviation, leprosy control, blindness prevention or eco-development of the Himalayas have a common refrain, namely the education and active participation of women alone can help to realise the goals we seek. These reports contain practical suggestions on what can and should be done. Thus, the report on poverty alleviation indicates how the District Rural Development Agency can help women to take advantage of institutional credit through specific attention to project formulation and training in the requisite skills including producer-based marketing. We need a cadre of credit officers—women and men—who are trained in institutions like the Institute of Rural Management, Anand and the National Institute for Rural Development, Hyderabad in methods of preparing economically viable projects for women based on local resources, preferences and marketing opportunities.

Today, a poor family has an economic stake in not sending the girl child (also, frequently boys) to school. Can we create an economic stake in sending the child to school? A "Food for Learning" project was recommended for this purpose by the Expert Group on Poverty Alleviation of the Planning Commission. It may be difficult to find resources for such programmes on a national scale. To start with, can at least something be done for the children of families with no assets—either land or livestock? Studies have shown that under the Employment Guarantee scheme of Maharashtra, a majority of women reporting on work sites belonged to scheduled castes owning no land. These are the very people who often suffer from the introduction of new technology. What we need are techno-

gies which can help to achieve diversification and not displacement of labour use. If a rice transplanting machine is developed, it will save women from a back-breaking job. At the same time, it is likely that such a machine will render millions of women jobless. Perpetuation of human drudgery cannot be a long term or acceptable method of employment generation. Can simultaneously with steps for reducing drudgery, measures be taken which can provide new sources of employment involving the preparation of value-added products from local raw material? Can we integrate emerging technologies like micro-electronics and biotechnology with traditional skills so that we are able to achieve a blend of the desirable features of both and at the same time avoid technological obsolescence?

Since agriculture including crop husbandry, animal husbandry, fisheries and forestry, is the major source of income and employment in addition to food in rural areas, I will like to deal with in some detail the approach of the International Rice Research Institute to imparting a rural woman user's perspective in agricultural research and development.

Women and Agriculture : historical perspective

Some historians of agriculture believe that it was women who first domesticated crop plants and thereby initiated the art and science of farming. While men went out hunting in search of food, women started gathering seeds from the native flora and began cultivating those of interest from the point of view of food, feed, fodder, fibre and fuel. This view is strengthened by the fact that women have been traditionally seed selectors. Even today, this tradition has continued in many parts of the developing world.

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Women have played and continue to play a key role in the conservation of basic life support systems such as land, water, flora and fauna. They have protected the health of the soil through organic recycling and promoted crop security through the maintenance of varietal diversity and genetic resistance. In many hill and remote areas of developing countries, such as the Himalayan region, agriculture is largely in the hands of women, since men tend to go to towns and cities in search of salaried jobs which can augment family income. Therefore, without the total intellectual and physical participation of women, it will not be possible to popularize alternative systems of land management to shifting cultivation, arrest gene and soil erosion, and promote the care of the soil and the health of economic plants and farm animals.

Women also tend to look at problems in their totality—from the sowing of a crop to its ultimate utilization either as food, feed, or raw material for industry. Since they are usually in charge of marketing, they generally possess a clear understanding of market preferences and prejudices. Therefore, for an economically and ecologically sustainable agriculture, the involvement of women farmers and farm women (agricultural labor with or without assets) in the process of modernization of farming practices and village industries is absolutely essential.

In addition to working as farmers and farm labor, women shoulder the responsibility of rearing children and looking after the home. Thus, the triple burden of child rearing, farm work, and household duties has fallen on them since the time the domestication of crop plants took place about 12,000 years ago.

The role of women in agriculture has changed dramatically in developed countries after the advent of science and techno-

logy in farming practices. Gradually, farm men and women have been drawn away from the routine operations of farming and absorbed in the industrial and services sectors. This has usually led to (a) reduction of drudgery, (b) improved productivity, (c) enhanced income, and (d) diversified and flexible opportunities for productive and remunerative employment in both rural and urban areas. In most developed countries, mechanized agriculture is operated and managed by a small number of men; very few women remain in the agricultural sector except in food processing industries and backyard livestock and vegetable production. Japan is an exception. Women there account for just over 60% of the total agricultural labor force and provide about 40% of labor in rice cultivation. They operate and maintain farm machinery and play important roles in farm decision-making. Thus, diversification of income-earning opportunities rather than unemployment has been the result of modernization of agriculture in developed countries.

In contrast, the experience of developing countries has been uneven. Modernization of agriculture has provided women with better income-earning opportunities in some areas but has displaced them from their traditional roles in others. The latter is particularly serious when job destruction is not accompanied by job creation in other activities, either within a diversified agricultural sector or in non-farm employment.

Such a negative impact on employment could cause much distress particularly to families where the total family income is small and hence needs to be supplemented by the earnings of both husband and wife. Lack of employment opportunities for women belonging to families with few or no assets—either land and/or livestock—leads to malnutrition and under-nutrition among children and women who suffer most from inadequate purchasing power of the family. In several developing countries, the female child suffers particular discrimination,

resulting in imbalances in the male-female population ratio. Therefore, there are strong linkages between the welfare of an entire family and the ability of women to enhance total family income.

Another aspect of this problem relates to technologies for tasks carried out or managed by women. In many countries and particularly in Africa, East and Southeast Asia, women play major roles in farm and financial management. Moreover, many of their agricultural roles require considerable skills, for example, in seed selection, storage and pre-germination testing, organic recycling, the identification and control of pests, pathogens, and weeds, and post-harvest technology. Nonetheless, many of the jobs undertaken in rural areas by women involve much drudgery and result in little income. As men's decision-making roles are more publicly visible, government policy makers, scientists, and manufacturers of agricultural machinery have generally tended to neglect women's technology needs. Women have also been generally bypassed by extension services. Their numbers in scientific and extension services are generally small. Consequently, they continue to remain as unskilled workers with uncertain income.

The challenge hence lies in integrating brain (technology), brawn (physical work), and bank (credit and other resources) in a mutually supportive manner so that both men and women can play an active role in improving the productivity, profitability, stability and sustainability of major farming systems. How can this be done?

II. RESEARCH AND TRAINING NEEDS

The following three aspects merit careful consideration :

A. Impact of new technologies on women - specific occupations :

A careful study of the impact of new technologies should be undertaken in selected farming areas taking the family as a unit. Families with assets (land and/or livestock) and without assets (landless labor dependent entirely on wage earnings) should be considered separately for measuring the impact of new technologies. Within the family, the impact on women with reference to both employment and income should be studied separately so that household data can be disaggregated for analyzing the impact of new technologies on women. The impact should be measured in terms of the additional jobs created and the jobs made redundant and thus lost following the introduction of new technologies, both at the production and post-harvest phases of major farming systems.

B. Technologies for women :

There is need for compiling an inventory of opportunities opened up by new technologies available for women belonging to (a) farming families and (b) landless labor families. What are the precise suggestions of scientists with regard to the technologies available for women and particularly for those seeking wage employment? A catalogue of the opportunities, either present or potential both at the production and post-harvest phases, should be prepared. It will be useful if scientists could indicate whether the technologies developed by them for reducing drudgery and increasing the energy input-output efficiency ratio could lead to a diversification of labor use and income or only to the displacement of women wage laborers from their traditional occupations. Since women will benefit greatly if there is flexibility in the timing, duration and place of work, there is particular need for examining what efforts, if any, have been made by scientific institutions to introduce flexibility in time and place in jobs for women. Such inventories should be part of an on-going dialogue between

scientists and users so that research priorities reflect user's needs.

C. Women in technology development and transfer :

Based on an inventory of opportunities for new avenues of employment opened up by science and technology, there is need to review methods of promoting the greater involvement of women, both in technology will have to be carefully reviewed and appropriately modified and expanded. In particular, steps, must be taken to provide women with managerial and organizational skills so that they themselves can operate new technologies such as those relating to biofertilizers, seed production, pest surveillance, biomass utilization, crop-livestock, and crop-fish integrated production systems.

D. Studies on delivery systems :

The delivery of production inputs like seeds, fertilizer, and credit as well as new knowledge and skills often tends to have a sex bias in favour of men. Hence, the knowledge and skill transfer mechanisms adopted by extension agencies and the input supply procedures adopted by both government and non-governmental organizations need careful study. Similarly, the price support and marketing systems as well as the steps taken to improve the other links in the production-consumption chain will need examination from the point of view of their relevance to women farmers, farm managers, and farm workers.

It has been the general experience so far that if the target group with regard to the size of a farm holding in agricultural research and development programs is the small farmer, then all farmers-whether big or small-derive economic benefit from new technologies. The reverse however will not be

true. Similarly, it is my conviction that if the target group with regard to sex in agricultural R & D efforts is women farmers and farm workers, then all members of the farm family-men, women, and children-will benefit. The reverse may not always be true, as the experience gained so far generally suggests. Hence, we need to give a fresh look at our agricultural and rural development strategies and programs.

III. GENERATION OF TECHNOLOGIES FOR WOMEN-SPECIFIC OCCUPATIONS

Most research programs have both a short and long time perspective. In the short term, the aim is to bridge the gap between current production and actual need for basic staples and thereby ensure the availability of food for all at reasonable prices. In the long term, the aim is to promote sustained agricultural advance coupled with economic benefits to all regardless of sex or social status. Some success in the first objective has been achieved in most countries of Asia and Latin America, as per capita food grain production has increased during the past 15 years. It is therefore time to look more deeply into questions of equity as judged by the relative benefits which flow to men and women, whether farmers, farm labor, or consumers. What should centres do in this regard?

There is no simple or single answer to this question. The role of women, both as users and beneficiaries of new technologies, varies widely and is influenced greatly by religious, cultural, economic, and ecological factors. Therefore, a universal prescription with regard to research policies will be irrelevant and even harmful. There are however three broad areas of activity which merit the attention of R & D agencies. These are:

- A. Sensitization
- B. Studies and surveys

C. Scientific strategies and programs

I will like to deal with these briefly.

A. Sensitization :

"Knowledge leads to unity: Ignorance to diversity." Where there is no awareness, it is futile to expect action. Hence, the first step is to arouse human consciousness of the existence of the problem.

There is need to take a specific look at the implications of technologies under development for women managers and laborers. High yielding varieties are clearly labor using but we do not know how different components of such technologies affect employment. For example, many labor displacing technologies though designed to relieve seasonal bottlenecks, may result in an increase of total annual employment. Similarly, we know that women play a major role as farm managers but we do not know enough about what this means for technology development and adoption. Hence, issues relating to both research coverage and impact in terms of sex need careful study. A starting point for stimulating thought and action and for strengthening the users' perspective in research policy making is an organized effort in sensitizing policy makers and funding organizations to such issues. The VI Five Year Plan of India by introducing for the first time in the planning history of the country a chapter on "Women and Development" has shown how the sensitization process can be initiated.

B. Studies and surveys :

Once there is appreciation of the concerns, the need for collecting precise data and for gaining meaningful insights into the problems arises. A carefully designed malady-remedy

analysis will be necessary for assessing alternatives and priorities in technology development and transfer. For this purpose, social science institutions need to be linked up with national and international agricultural research systems. Much work on women and other types of users takes place in universities. The development of effective networks involving agricultural researchers and social scientists can help to guide scientists, extension workers, and developmental administrators on methods of combining efficiency and equity in technology development and transfer.

There is a need to develop a problem-solving approach using multidisciplinary research teams and a variety of complementary research methods. The standard surveys should be supplemented with low-cost, rapid and imaginative ways of collecting reliable and relevant data. There is also an urgent need for developing methods of studying the problems of men and women without assets (either land and/or livestock). A careful study followed by an objective analysis of the data collected is essential for rational decision-making by those engaged in the development and transfer of new technologies.

Suitable survey techniques will have to be developed which can help to reveal not only the consequences of new technologies on women specific occupations but also the constraints responsible for the inadequate transfer of relevant technologies to women. Efforts of banking institutions in the identification of credit-worthy occupations for women need study and monitoring. Public policy issues such as those relating to land and property ownership rights, credit supply, personnel policies of R&D institutions, etc. need particular attention. Above all, it is necessary to study the organizational and institutional aspects of input delivery and producer-oriented marketing.

C. Scientific strategies and programs :

It is essential that each research institute carefully

considers its research priorities and programs from the users' perspective. For this purpose the following questions will have to be asked:

1. Will technologies under development result in a reduction in drudgery and improvement in productivity and income?
2. Will they be labor displacing or will the result in labor diversification?
3. Will they result in equal benefits to both men and women or will they have built-in seeds of sex discrimination?
4. Will they provide some flexibility in relation to timing, duration and place of work for women?
5. Will they help to make unskilled labour become skilled?
6. What steps are necessary to ensure that women managers and labor benefit from new technologies?
Social scientists and management experts should work with biological scientists to determine:
 - the package of technology most beneficial to users, taking account of sex-related differences in needs and constraints
 - the package of services including the delivery of knowledge credit, and inputs with reference to their relevance and benefit to women users
 - the package of government policies in agrarian reform, rural development, credit, and marketing essential for conferring equal benefits on men and women farm managers and labor.

Unless socially sound technological packages are coupled with appropriate packages of services and government policies, the fruits of scientific work will not automatically accrue either to men or women. Appropriate women's organizations can help both to promote attention on the special problems affecting women and to ensure the flow of benefits to them.

IV. INVENTORY OF TECHNOLOGIES FOR WOMEN IN RICE FORMING SYSTEMS

Women play a pivotal role in rice cultivation in most countries is given in Table 1. The role of women in farm management decisions in Nepal is indicated in Table 2. In order to understand what scientists can do to reduce drudgery in women-specific occupations and to provide opportunities for more remunerative and skilled work for rural women, a questionnaire was circulated among scientists of IRRI (Annexure 1). Based on the replies received, the following indicative inventory of opportunities for women farmers and laborers was compiled.

A. Technologies already developed:

The following improved technologies are relevant to the traditional occupations and skills of women employed in rice farming systems at the production and/or post-harvest phases. They will generally need to be adapted to the specific physical, biotic, and socio-economic conditions of different regions within countries. In some cultures these technologies could well be used by men or women: the important point is *not* to assume automatically that they are should be used by men, for in many cases there are strong social reasons which suggest they could be utilized more effectively by women.

(1) Variety characteristics : Criteria for breeders and technology transfer programs.

Women often share or have complete responsibility for the selection and purchase of seeds, and for seed storage and pregermination tests. They are also involved in cultivation and do most of the drying and husking. Livestock, which are fed rice by-products, are often exclusively cared for by women. It is therefore important to consult women about criteria to be used in the breeding of new varieties and to involve women in programs for the transfer of improved varieties. Women's needs, skills, knowledge, and views need to be taken into account with respect to :

- varietal characteristics, both desirable and undesirable
- seed quality of new varieties, and methods of obtaining and ensuring good quality seed (e.g., selection of best panicles, storage of the panicle, row-sowing of seeds from each panicle separately to test the seed purity);
- varietal identification;
- interaction with weeds, insect pests and pest predators and soil conditions;
- tolerance of drought, floods, temperature, solar radiation;
- drying and storage characteristics of grain, and relation to milling recovery;
- quality of by-products (e.g., suitability of straw for animal feed, roofing, fuel requirements); and
- cooking and eating preferences.

(2) Seed production :

Since women have been traditionally seed selectors, they have a natural advantage in organizing scientific seed

production programs. Seeds of rice varieties are either not universally available, too expensive, of poor quality, or contain mixtures (or all of the above). Rice lends itself well for quick seed increase : multiplication factors of 500-1000 (grams seed harvested/gram seed transplanted) are possible.

(3) Soil fertility and fertilizer management :

In areas where organic manure is commonly used, it is generally made and carried up the hillside to the fields by women but it is usually incorporated by the men who do the ploughing. Women tend to apply mineral fertilizers less regularly than men. Women's knowledge and skills therefore need improving with respect to :

(a) Diagnosis of soil deficiencies :

Women need training;

- to recognize common nutritional disorders of rice such as nitrogen, phosphorous and zinc deficiencies, by crop observation and the use of soil testing kits;
- to assess the fertilizers requirements needed to correct such deficiencies;
- to determine the most suitable source of these nutrients (various types of chemical or organic fertilizers, used alone or in combination; rotations with legumes, green manure crops or fallow; fish deposits) taking account of relative costs and returns, technical efficiency, availability of nutrients and the availability of labor and special skills needed for fertilizer application; and
- to provide biofertilizers like azolla and blue green algae in order to increase the use of home grown inputs.

(b) Compost and farmyard manure (FYM):

In areas where compost and FYM are already commonly used technology development and transfer programs are needed to improve women's knowledge of and skills in the production processes, handling storage and use of compost and FYM.

Sex-related constraints in the efficient use of these organic fertilizers need to be identified. For example, in the Himalayas women carry FYM up to the hill fields over a period of 2-4 weeks (due to labor bottlenecks and a desire to spread this very hard work over time) while the men later incorporate it when ploughing. The manure remains in piles in the fields for this period, and suffers nutrient loss. The use of women's reciprocal labor groups for carrying the manure on the day the field is to be ploughed could be a possible solution worth experimentation.

(c) Azolla

Azolla production could provide new employment opportunities for women. Its labor-intensive processes include maintenance, multiplication, harvesting, transporting (from multiplication place to the farm), inoculation, and incorporation. Except for incorporation, all other processes can be performed by women. Maintenance and multiplication of azolla need a lot of care and patience, and women can do this efficiently. Azolla technology considerably reduces the weed problem but the alternative employment created will compensate for labor displaced from weeding.

Related points are ;

- Training will be needed, especially for maintenance, multiplication, and incorporation of azolla;

- Azolla nurseries will be needed to ensure a continuous supply of azolla starter. Given sufficient demand for azolla as fertilizer and as feed, a commercial starter market could develop in each village or in a group of villages.

(4) Raising of community nurseries :

Women could be trained to raise community nurseries. Such nurseries will help to provide healthy seedlings of the most appropriate variety to small farmers for timely transplanting. Women can also raise *DAPOG* nurseries for use in mechanical transplanting. Landless women could rent or acquire small areas of land for this income-generating activity.

(5) Integrated Pest Management (IPM):

A number of women's farming activities particularly qualify them to play an important role in IPM: women often select, purchase and store seed; monitor and report pests and diseases while weeding; take part in decisions on crop rotations that break pest and disease build-up, etc. IPM depends for its success group endeavour on the part of the entire village community and women could organize such community cooperation.

(a) Monitoring of pests and diseases :

This requires regular field monitoring visits. Women are better placed than men to do this since they are present in the fields for extended periods for weeding. It may be necessary for women (or men) to make additional weekly visits for monitoring in between the weeding operations. This will especially be the case in irrigated areas where each weeding is often

done within a few days, with hired labor supplementing family labor.

Women will require training in :

- the sampling and identification of pests and diseases, their patterns of build-up and the types of damage inflicted. Where local names for common pests and diseases are not in general use, suitable names should be coined and popularized through extension and training programs.
- the diagnosis of tungro disease in ratoon, volunteer and other rice stands outside the normal cropping season.

(b) Pest management practices :

Women (and men) will require training to improve their knowledge of and skills in :

- different pest and disease management practices, including the use of seed resistant varieties, crop rotations, synchronous planting within a region, chemical and biological pesticides;
- the relative effectiveness and costs of these different practices, including labor implications and side benefits or hazards ;
- the assessment of economic thresholds for selecting between alternative or complementary methods of controls ; this would be in the context of improved monitoring of farm expenses and computation of farm income. (In countries like the Philippines where women have financial control, it is crucial that women should be informed of the economic and technical viability of IPM methods.)

- how to apply chemical and/or biological pesticides. The weight of the sprayer is sometimes put forward as an excuse for training only men, despite the fact that the women usually have to fetch the water for the sprayers. Ultra-low sprayers can be easily handled by women.
- safety in pesticide use, transport, handling, storage and disposal. Women are more concerned and responsive to safety training than men, especially when children are at risk.

(c) Biological pesticides :

Important opportunities exist for involving women in the development and transfer of plant derivatives such as neem seed oil, cake and crude extracts for pest control. Ripe neem fruits are collected, depulped and processed by women and children in several parts of India. Simple processing technology is already in use and has no harmful side-effects.

Greatly expanded production by women of neem oil and cake for crop protection and dried neem leaves for protecting stored grain from insect attack and spoilage could be an important seasonal activity, particularly as a means of supplementing the income of landless women and their families. Women farmers could also be taught how to use neem and other plant products for pest control in the field and in storage.

(6) Integrated weed management :

Given women's predominant role in weeding, applied research on weed problems will require on-farm trials involving women. The technical aspects of this work will not be

affected by sex-related factors. However, the implementation of appropriate weed control practices will be affected by women's knowledge of and skills in :

- the identification of weeds and their interactions with water levels, soil moisture, soil type, land preparation, planting dates, other crops in rotation with rice (i.e., to identify the weed's habitats : where they are and why);
- the technical effectiveness and cost of herbicides, used in conjunction with manual uprooting at the second weeding;
- the opportunity cost of women's labor, affecting the choice of different methods of weed control, e.g., herbicides; manual weeding; line seeding (by drills or transplanters) to facilitate weeding; appropriate water levels; azolla production or dense transplanting, to suppress weed growth; and additional crops in the rotation to break the build-up of rice-specific weeds;
- women's preferences for alternative crops in the rotation, taking into account nutritional needs, and eating and cooking habits;
- the development of improved tools, such as the rotary weeder, which are suitable for women's physique;
- correct choice and use of herbicides.

(7) Water management :

Increasing attention is being given to improving farmer's participation in water allocation and distribution, irrespective of sex. However, in practice, farmer's water management associations often have no or few women members, even in areas where women are landowners and/or play important roles in the cultivation and management of rice farms.

Senior administrative and training staff of irrigation schemes should play a major role in ensuring that women are (i) appointed to farmers' irrigation associations, and (ii) are given the technical, managerial and leadership training needed to overcome social prejudices against women and to ensure that they are treated with respect and as equals by men farmers and junior extension staff. Separate training courses for women should not be necessary.

(8) Drying :

The following techniques could solve some of the difficult problems facing women in drying grain in unreliable weather :

- salvaging rice from submergence and wetting in rains and cyclones by immersing wet panicles in 5% NaCl solution. This inhibits sprouting, discoloration, mold development, and spoilage;
- when drying rice sheaves, covering the panicles with the straw of the succeeding bundles in an overlapping manner to protect the grain from different solar radiation, dew, mist, and drizzle;
- practising synchronous planting and harvesting and using uniform plant population densities to ensure more even drying the field.

(9) Agricultural machinery :

A number of machines are now available to increase efficiency, lower costs, and reduce drudgery. They are popular among male farmers. However, they are not so often used by women farmers, partly for social and institutional reasons, and partly because they are too heavy to be operated easily

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by women. In Japan, farm machinery are widely used by women. Testing programs are needed too assess their suitability for women and, where necessary, to make appropriate design changes. Social and institutional constraints to women's use of agricultural machinery require investigation and feasible solutions. Technology transfer programs should give special training to women in the operation, maintenance, and simple repairs of the equipment.

Specific examples of technologies are :

(a) For production

- manual transplanters, row seeders, row weeders (generally too heavy for women who need a higher design);
- ultra-low sprayers (suitable for use by women);
- Tapak-tapak pump (probably suitable for use by women; it could open up opportunities for women's dry season vegetable production in rice fields or at the homestead); and
- reapers and threshers (the IRRI axial-flow thresher has increased the use of female labor in harvesting-threshing activities in the Philippines. The traditional manual threshing methods were too demanding on their physical strength).

(b) For domestic work

- rice husk fuelled stoves for cooking and parboiling;
- charcoal production from straw and husk; and
- biogas cooking stoves.

(10) Extension :

Extension services should :

- upgrade the skills of extension workers in these improved technologies for women;
- expand recruitment of female extension agents;
- depending on the appropriateness for specific cultures, train male and female extension staff to work with both men and women farmers and compare their relative effectiveness in this;
- improve women's awareness of new production and post-harvest technologies;
- set up village-based training courses with men and women farmers, involving practical field work;
- train women in accounting, bookkeeping, and management skills;
- help organize farmers and irrigation authorities where communal action is required. For example, introducing pest control measures such as synchronous planting or a rice-free cropping season; and
- develop a two-way dialogue between extension personnel and farmer. Women (and men) farmers need encouragement and "training" to extract or demand the information they need from the extension staff.

B. Technologies in the assembly line :

The following technologies which are now being developed could provide new opportunities for increasing women's employment and income, and reducing their drudgery.

1. Hybrid rice seed production :

Women already play an important role in the production and processing of hybrid seeds, for example, in China (rice) and India (cotton).

Although these jobs can also be done by men, it appears that women are particularly careful and efficient in doing the work. They need training in :

- seed production process, i. e., clipping of flag leaves, dispersal of pollen by "rope pulling" or the "stick" method; and
- cleaning of hybrid seed and its testing for viability.

Hybrid rice seed production units would need to be set up on a commercial scale, with quality controls and an efficient distribution systems. Men or women could be involved in a managerial and training capacity.

2. Driers and drying techniques :

Several multipurpose driers have been developed for village and farm-level crop drying, using local materials (coconut and mud-rice husk bricks) and non-conventional energy (wind and agricultural waste, including rice husks).

The program is also working on methods to lessen the percentage of brokens at milling caused by the large moisture variance. This is of particular concern with the spread of new varieties which have a moisture variance of 40% compared with 15% for traditional varieties. This is a research area that will be of particular relevance to women since they are: generally responsible for husking or taking rice to the mill; encounter cooking problems posed by brokens; separate the brokens from the bran; and need to control moisture levels in storage.

3. Agricultural machinery :

There are a number of technologies currently under development which could potentially reduce women's drudgery and generate employment and income for women

laborers. During the design and testing stages, their use by women should be taken into account.

Specific examples are :

(a) For rice production

- direct of seeding of rice
- fertilizer placement machines
- machines for incorporation of organic materials (e. g., azolla mixers)
- grain drying
- biogas generation

(b) For other productive work

- simple milking machines to increase efficiency and protect animals from injury (common in hand milking)
- oil extraction devices to extract oil from sunflower, groundnuts, rape seed, coconut)
- simple machines for preserving food, fruits, vegetables

Although excellent works being carried out by various agricultural engineering programs in Asia, relatively little attention has hitherto been given to women's post-harvest activities. Low-cost improved technologies which use local materials, renewable energy sources, and are easy to construct and maintain are needed for on-farm crop drying, winnowing, parboiling, husking, storage, handling, and transporting rice and other heavy crops during these operations in the home (e. g., devices similar to wheelbarrows), processing and preservation of other foods (vegetables, fruits, fish, cooking, and water provisioning.)

4. Biomass utilization :

Women already use rice straw, bran, and hulls for a variety of purposes. The quality of these products could be improved and their uses expanded with technologies now being developed. Some examples of the potential available for immediate farm-level experimentation are :

(a) Rice straw

- as a source of manure, incorporated with animal dung;
- as a substrate for mushroom culture;
- as a source of animal feed, the quality to be improved by subjecting it to alkali digestion and enriching it with urea and molasses;
- for paper manufacture; and
- for biogas generation and subsequent composting;

(b) Rice bran

- for animal and poultry feed

(c) Rice-hull or husk

- for extraction of solar grade silicon for use in the manufacture of photovoltaic cells;
- as a source of activated carbon, an important material used for bleaching oil, glycerine etc. as carbon filter and also used in the manufacture of pharmaceuticals;
- as a source of Furfural. By distilling rice husk with dilute sulphuric acid, the pentose present in rice husk would yield three water molecules and furfural. Here also we get important by-products like methanol and

acetone. Furfural is used in different forms for manufacture of cellulose acetate, nitro cellulose, shoe dyes, synthetic resins, etc.

(5) Mushroom culture :

Methods of mushroom culture using rice straw as a substrate could be introduced to women. This would improve the family's nutritional balance and could be a valuable source of income to farm and landless women. A particularly attractive feature of this activity is that it lends itself to decentralized home production supported by centralized services in the distribution of spawn and compost.

(6) Fish-rice culture :

Although fish-rice culture is traditionally practised by men and women in many Asian countries, especially China, India, Indonesia, and Thailand, new technologies have in recent years very considerably improved productivity and made aquaculture a highly profitable enterprise. These technologies are being developed in particular by the Freshwater Aquaculture Research and Training Centre (FARTC) in Orissa, India (belonging to the Central Inland Fisheries Research Institute which has 11 or 12 centers scattered throughout the country), the Inland Fisheries Research Institute, Agency for Agricultural Research and Development, Indonesia, and the Fresh Water Fish Research Station, Central Luzon State University, Philippines.

FARTC already has special programs for rural, particularly landless women. Farm women are also involved in the programs aimed at the farm family. These programs for women which deserve support within the WIRFS network and which could be expanded in India and other countries are :

- THE RAISING OF FINGERLINGS FOR SALE. In some cases women purchase the fry for rearing. The fry are fed on rice bran and oil cake (e.g., groundnut or mustard). One kg of fry at Rs. 10 can bring a return of about Rs. 40-50. FARTC has also trained women to induce fish to breed by giving pituitary injections to the females. Women are often better at this than men.
- Making and repairing nets. This is a traditional women's activity in the above mentioned countries, as well as Bangladesh. FARTC has trained women in improved techniques for these activities and set up a women's cooperative near the Centre where women earn Rs. 10-12 a day. These activities could be adapted to other areas.
- Processing and marketing. In many Asian countries women are involved in these activities. For example, in India women do about 99% of fish marketing. There is considerable scope for improving the efficiency and hygiene standards of fish processing and marketing, from which both farm and landless women could benefit.
- The profitability of fish-rice systems can be further enhanced by adding duck and pig enterprises (if these are culturally acceptable and/or there is a market demand for these products). Women could also be trained to operate such enterprises.

(7) Livestock - rice systems

These systems are traditional yet hitherto limited attention has been given to their *integrated* improvement. In many

Asian countries the care of livestock is predominantly and sometimes completely women's responsibility. They cut fodder, use the rice hulls, bran and straw as feed (which they have often threshed and nearly always husked), make farmyard manure, water the animals, and make dairy products such as curd and ghee, etc. Any livestock - rice farming systems program must give specific attention to women's labor, skills, knowledge, opinions, needs, constraints, and potential in these areas.

Specific areas for improvement that are currently under development in three ARFSN sites (Indonesia, Philippines, and Thailand) are :

- development of dual-purpose (i) rice-legume rotations (for both grain and fodder, e. g. mungbean, soyabean, cowpea, pigeonpea, groundnut; some pigeonpea varieties can be ratooned for fodder after the grain is harvested, (ii) rice-cereal rotations (e. g., sorghum and maize), and (iii) rice-forage grasses;
- use of forage crops e. g., the fodder tree ipil - ipil (*Leucaena leucocephala*) and Napier grass (*Pennisetum purpureum*) grown on rice bunds or in the home stead for supplemental feeding (ipil-ipil will also provide fencing, windbreaks, and fuel);
- use of crop residues as feed (e. g., rice husk, bran and straw, after fortification with urea and molasses and alkali treatment to improve digestibility);
- combinations of different types of feeds, including molasses-salt-mineral supplements, their availability, and economic assessment;
- residual effects of pesticides and herbicides on crops or crop residues used for fodder, and on livestock watering places;

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- use of animal manure for field and garden crops, after treatment;
- women's livestock management skills and problems, labor constraints, sources of technical information about improved management practices, feeds, knowledge of animal diseases and recommended preventive measures, access to veterinary services, marketing information and services, provisions to pay women directly for their livestock produce and not their husbands.

(8) Vegetable-rice systems :

Women commonly cultivate backyard vegetable gardens throughout Asia. Since water is often a serious constraint, particularly in the dry season, vegetables could also be grown on the bounds of irrigated paddy fields vegetable production (which men rarely engage in) deserves more attention in research and development programs as an important means of improving family nutrition and providing women with some additional income.

Women would benefit from training in the use of organic materials and compost, and improving garden lay-out and methods of establishing nurseries.

(9) Sericulture-rice systems :

Although sericulture is a traditional women's enterprise particularly in the slack rice cropping season, relatively little scientific attention has been given to improving sericulture within an integrated farming systems approach. Procedures are inefficient and time-consuming and in many places women are therefore only able to produce enough for family needs and cannot meet market demand.

(10) Apiculture :

The introduction of apiculture in rice farming areas will be another source of nutrition, income, and home employment.

(11) Food processing :

The following cottage industries could be developed by women for consumption and the market :

- making noodles from mungbean, a popular crop in rice-based systems;
- drying mushrooms;
- preparing bread and cakes from blended wheat and rice flour;
- making soya sauce, pickles chutneys, jams;
- preparing puffed rice, and savories using lentil, rice, and spices;
- a whole series of other products developed by the Central Food Technological Research Institute, Mysore.

(12) Biotechnology :

The emerging techniques in tissue culture and whole plant utilization will provide ideal opportunities for converting unskilled workers into skilled technicians. Suitable women's rural biotechnology associations should be promoted by the National Biotechnology Board.

The above is not intended to be an exhaustive inventory of opportunities for women in rice farming systems. They will however help to illustrate what all can be done provided there is the will to harness science and technology for helping rural women.

VI. CONCLUSIONS

Some of the steps needed for imparting a women users' perspective in R & D work in the fields of agriculture and rural development are indicated in Table 3. While action on the above lines is feasible and should be taken, it is important to recognize that science is not a magic wand with which sex inequalities in workload and economic returns can be made to vanish. This should be emphasized clearly as otherwise false hopes will be aroused about the capacity of science and technology to remove deep-seated social maladies.

In the ultimate analysis, it is only the concern, commitment and concerted action of agricultural research systems and policy makers that can lead to meaningful results in imparting a women user's perspective in research priorities and strategies. To obtain a correct perception of priorities, there is need for direct interaction between scientists and women farmers and laborers. Scientists will have to listen and learn from resource poor rural women.

The greatest challenge before R & D institutions lies in motivating scientists and technologists to undertake a process of "listening and learning" through collaboration with poor women while developing their research priorities and strategies.

All this will call for a learning revolution. Such an education movement to be successful should aim not merely in assisting women to acquire new skills and to take advantage of development projects but more importantly aim at the education of men. Many of the current difficulties stem from the differing perceptions of men and women whether it be in family planning or sanitation or social forestry or drinking water supply. The biogas and social forestry programmes

will not succeed so long as men do not take interest in saving women from spending several hours a day in gathering fuel wood. The "Sulabh Sauchalaya" kind of sanitary toilet facilities will not spread so long as men are indifferent to women's needs in this respect. We will not have over 200,000 villages with out even one source of safe drinking water within a reasonable distance, if men were to fetch the water. Examples of this kind can be multiplied. The answer thus lies in a two-pronged strategy involving first, the social education of men and secondly, the promotion of organisations and institutional structures which can help themselves.

J. P. Naik was enthusiastic about the role that the Centre for Women's Development Studies can play in generating the requisite quantum of awareness, analysis, and action in relation to the role of women in development. I wish the Centre much success in making J.P.'s dream come true.

TABLE-3

Steps needed for imparting a women users' perspective in R & D efforts

S. No.	Field of endeavor	Coverage
1.	Sensitization	Policy makers, scientists, administrators, extension workers, input supply agencies, mass media, etc.
2.	Surveys and studies	Role, opportunities, constraints and consequences as related to : a) package of technology b) package of services including delivery systems for knowledge and skill transfer and input supply c) package of government policies
3.	Science and technology with regard to both the generation and transfer of appropriate technologies	Technologies with particular emphasis on: a) greater skills, higher productivity, and profitability b) reduced drudgery c) diversification of employment opportunities d) flexibility in place, time, and duration of work e) concurrent steps in job destruction and job creation
4.	Training	Designing knowledge and skill transfer systems for illiterate as well as literate women farmers and farm labor and training larger numbers of women scientists and managers

INTERNATIONAL RICE RESEARCH INSTITUTE Inventory of Technologies for Women in Rice Farming

1. Name of the Scientist and Department.
2. a) **Technologies already developed**
Description of new technology and its relevance to the traditional occupations and skills of women employed in rice farming systems at the production phase and/or post-harvest phase. Please describe each item of new technology separately.
- b) **Technologies in the assembly line**
Potential impact of technologies currently under development by your group on women with regard to :
i) drudgery reduction
ii) income and employment generation; and
iii) new opportunities for quality of life improvement
3. What additional training programs and management and organizational skills will be needed for women to derive benefit for both already available to emerging technologies?
4. Please provide any other information which may be relevant to the goal of ensuring that the jobs destroyed by new technologies in traditional sector are more than compensated by the jobs created by the modernization process, so that labor diversification and not labor displacement is the outcome of our research designed to enhance the productivity, profitability, stability, and sustainability of rice farming systems.

Signature

APPENDIX V

Chinese Academy of Agricultural Mechanization Sciences (CAAMS)

After discussion, the work plan for 1987-88 was finalized. This is incorporated in the Memorandum of Understanding (Annex 4). At the dinner hosted by CAAMS, Vice-Minister Li Shou Ren was also present. During the discussion, it was agreed that CAAMS and IRRI will jointly sponsor next year a Travelling Seminar cum Workshop on Agriculture Implements for Women in Rice Farming Systems. The aim of this travelling seminar cum workshop will be to get together 12-15 agricultural engineers as well as women users of farm implements in order to review the state-of-the-art in designing special farm implements for use for women both in the production and post-harvest phases of rice farming systems. A suitable provision will be made in the proposal being sent to The Ford Foundation for meeting the expenses of this workshop. Mr. Bart Duff from IRRI and a suitable engineer would be designated by CAAMS will serve as co-convenors for drawing up a detailed program. The help of CAAS as well as CNRRI will also be taken in making this program useful.

(ACTION: BD, JWJ, TParis)

Quan Zhongyu	Engineer Mechanization Research Institute
He Zhongling	Chief Foreign Technology Division
Tang Yonghong	Interpreter Information Research Institute

Both parties expressed satisfaction with the results of the collaborative activities conducted during the intervening six years. The range of research, development and training activities has increased in scope and coverage, generating scientific information, improved technology and has advanced the state of agricultural engineering in both institutions.

After a review of the work done in 1986-87, both parties agreed that the goals set at the Fifth annual meeting in July 1986 had been satisfactorily met.

The agreement reached in the sixth meeting, which reflects progress made and the collaborative workplan for 1987-88, is summarized below. Supporting documents are given as appendices to this Memorandum:

A. Exchange of Scientists

1. CAAMS will invite one engineer from IRRI to visit CAAMS for a period of ten days in May or June 1988 to review progress and exchange information on

collaborative engineering design and development projects.

2. IRRI will invite one engineer from CAAMS to visit IRRI for a period of two weeks in October 1987 to review potential collaborative design and transfer activities for hand tools and lowcost devices for rice farming systems (in conjunction with CAAS initiatives), equipment for women in rice farming households and village based agro-industrial equipment.

3. Based on the determination of the above exchange of visits, both parties may wish to arrange for placement of a CAAMS engineer at IRRI for a period of one year. The nature and objective of this arrangement will be specified through an exchange of correspondence.

4. Evaluation and extension of the IRRI-designed warehouse dryer will be discussed in detail by Dr. Y.W. Jeon during the IRRC and a subsequent visit to CAAMS in October 1987.

5. IRRI will invite scientists from CAAMS to attend meetings of mutual interest and benefit.

B. Collaboration in Scientific Research

1. Economic Research on Agricultural Mechanization, Income Diversity and Resource Productivity in North and South China (joint with CNRRI). Preliminary work has been completed on the selection of survey sites, development of data

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instruments and training of personnel. IRRI and CAAMS will continue to work with the China National Rice Research Institute (CNIRRI) to identify possible sources of funding to support this project. The scope of the project will be expanded slightly to include consideration of rice post-harvest technology in China.

2. Collaboration will be further developed by CAAMS and IRRI in the area of Rice Farming Systems. CAAMS will test and evaluate the inverted T Planter and work closely with the Asian Rice Farming Systems Network (ARFSN) to integrate suitable tools and equipment from China into Network activities. Dr. V.R. Carangal will visit China in November 1987 and further develop integrated research between IRRI, CAAMS, and CAAS (through Prof. Gou Yixian).

3. CAAMS agrees to provide design and technical information on tools and equipment suitable for use by Women in Rice Farming Systems (WIRFS) and for small-scale village agro-industries.

Training

1. CAAMS will send two engineers to attend the Agricultural Engineering short course in 1987-88.

2. CAAMS will send one participant to attend the Farming Systems Socio-Economic Short course in October 1987.

3. CAAMS will identify and nominate two

candidates for MSc training in agricultural engineering or agricultural economics at the University of the Phillipines or another suitable university beginning in April 1988.

3. CAAMS wishes to send one participant for two weeks of library training at IRRI in 1988.

4. CAAMS wishes to send one participant to attend the Agricultural Communications course sponsored by the IRRI Communications and Publications Department.

D. EXCHANGE OF SCIENTIFIC/TECHNICAL

LITERATURE AND INFORMATION

1. CAAMS and IRRI will maintain a regular exchange of publications, literature and technical information (blueprints).

2. Each party will provide agricultural engineering literature or information requested by the other party.

E. EXCHANGE OF EQUIPMENT

Where feasible, prototypes of new designs, including information about the performance of specific machines will be provided by CAAMS to IRRI, and by IRRI to CAAMS. If working prototypes are requested, the responsibility for the cost of the machine and shipping will be determined through an exchange of correspondence. Designs of current interest include the manually operated reaper, village-level rice mill.

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animal or manual irrigation pumps, and improved small-scale tools for weeding and seeding.

It was mutually and unanimously agreed that the ninth Planning Meeting of CAAMS and IRRI will be held at the International Rice Research Institute at Los Banos in 1988.

For the Chinese Academy of
Agricultural Mechanization
Sciences

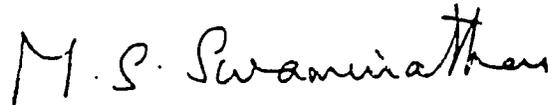
Hua Guozhu

Director

July 22, 1987



For the International
Rice Research Institute



M.S. Swaminathan

Director General

July 23, 1987

CWDS PUBLICATIONS

Samya Shakti— A Journal of Women's Studies is published in July every year. Each issue focuses on a major theme. In 1983, the focus was on Women's Studies, in 1984 Women and Movements, 1985 the Women's Decade, and in '86 Women's Identity in the context of the family. Samya Shakti is priced Rs. 30/- (\$ 18 for Individuals & \$ 25 for Institutions) only.

The Bulletin of the Centre—A bi-annual newsletter on research, teaching and action for women's development is published in April and October, every year. The bi-annual subscription for the Bulletin is Rs. 5 only.

Publications available

1. The Non-Aligned Movement and the International Women's Decade : A Summary of Decisions, CWDS, 1983 Rs. 3.00
2. Women's Work and Employment : Struggle for a Policy-Selections from Indian Documents, CWDS, 1983, Rs. 5.00
3. Women In Focus-by Kumud Sharma, Sahba Hussain, Archana Saharya, Orient Longman, 1984 Rs. 30.00
4. International Women's Decade : A Balance Sheet (Third J. P. Naik Memorial Lecture 1984) by Lucille Mathurin Mair, CWDS, 1985. Rs. 10.00
5. Who Cares? A study on the current situation of child-care facilities for low income working women in India., by Mina Swaminathan, CWDS, 1985. Rs. 45/-

Forthcoming

1. Rural Women's Claim for Priority : A policy-debate-Excerpts from Indian and International archives-compiled by Shanti Chakravarty.
2. Mahatma Gandhi's Writings on Women, Joint Publication of CWDS and Navjivan Press Ahmedabad.
3. Renewing the Pledge : Review of the Women's Decade in India.



CENTRE FOR WOMEN'S DEVELOPMENT STUDIES

The Centre for Women's Development Studies is a group of professionals striving to work for the realisation of women's equality and development in all spheres of social life. It visualises its main role as that of a catalyst, in assisting women to realise their full potential and exercise their active influence on society and its information. The goals of national policy which support fuller and equal participation of women in all aspects and spheres of national life and development can be promoted if the ideas and institutions that marginalise women's role and contribution in society are weakened or eliminated. The main objective of the Centre, therefore, is to help in the promotion, development, and dissemination of knowledge regarding evolution of women's roles in society and trends in social economic organisation which impinge on their lives and status, with a view to :

1. enhancing women's effective participation in the development process ;
2. assisting in the framing and implementation of measures for realising women's equality ;
3. changing social attitudes regarding women.