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Will Farmer Participatory Research Survive in the International Agricultural Research Centres?

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WILL FARMER PARTICIPATORY RESEARCH SURVIVE IN THE INTERNATIONAL AGRICULTURAL RESEARCH CENTRES?

Sam Fujisaka

Introduction

There have been several distinct stages to research at the International Agricultural Research Centres (Rhoades, 1988). Research in the 1960s to early 1970s sought to increase production through improved germplasm. Cropping systems research in the late 1970s and farming systems research (FSR) in the mid-1980s worked to increase the productivity of commodity-based systems and featured other crops, livestock, gender issues, and researcher-designed and researcher- or farmer-implemented trials. In the late 1980s, concerns for equity and sustainability led to interdisciplinary on-farm team research organised by agro-environments, and substantial farmer participation. Recent emphasis – driven by donors and the Consultative Group of International Agricultural Research Centres (CGIAR) – has been on 'upstream' or 'strategic' research and on greater collaboration with centres' 'stakeholders'. This is combined with the hope that national agricultural research programmes will conduct 'applied' and 'adaptive' research. In many centres, the current strategy may feature diminished on-farm research and so place less value on farmer participation.

These historical trends are illustrated in detail with the example of the International Rice Research Institute (IRRI).

Four Research Stages at IRRI

Breeding for Yield Increases

As the first research centre of what was to become the CGIAR system and as a source of the 'Green Revolution', IRRI provided improved germplasm – high-yielding semi-dwarf rices – in order to increase global food output in the face of high population growth. Plant breeders, geneticists, physiologists, and pathologists contributed to the effort.

In terms of results, IR8 yielded 8.2 t/ha in the dry season on experimental fields and was released for use by other breeders in 1966. By 1968, IR8 was grown on ten million hectares and rice yields began to rise in the tropics. By 1969, some 30 varieties with IRRI origins and with greater resistance to insects and diseases had been released by national programmes. By 1973, 20% of South and Southeast Asian ricelands were planted to the semidwarfs. IR36 in 1976 and IR42 in 1977 reflected continued work to improve resistance to pests and tolerance to poor soils. IR36 covered 11 million ha in 1982, but was then replaced by IR56 in response to brown planthopper problems. In 1985 a high yielding rice of better eating quality (IR64) was introduced. By 1989, more than 900 varieties with IRRI parentage were released in 38 countries. Up to the present, IRRI has also collected more than 85,000 germplasm accessions (IRRI, 1991).

Farmers were considered recipients and, along with consumers, beneficiaries of breeding research. At present, there is increased interest in eliciting and applying their technical knowledge associated with the germplasm. That is, to conserve and better utilise rice biodiversity, farmer technical knowledge is being collected along with the rice seed.

Cropping and Farming Systems Research

As rice breeding gains were consolidated, concerns about the impacts and on-farm relevance of new technologies led to the inclusion of agronomists and agricultural economists in IRRI's research efforts. Since 1974, IRRI and scientists from ten countries have worked together via the Asian Cropping Systems Working Group, later known as the Asian Rice Farming Systems Network (ARFSN). The research of the national scientists and IRRI agronomists, weed scientists, entomologists, and agricultural economists resulted in a landmark book on on-farm cropping systems methods (Zandstra *et al*, 1981), in an IRRI training course on farming systems research and extension, and later in on-farm interdisciplinary team research by (predominantly) IRRI researchers at an upland site in the southern Philippines (Go and Go, 1993).

Farming systems research represented an expansion of concerns to include gender issues, livestock, including rice-fish and the rainfed lowland environment. IRRI had a visiting anthropologist in the early 1980s and many of her efforts were directed to establishing the role of anthropologists in interdisciplinary teams developing improved food technology (IRRI, 1982).

Farmer participation in cropping systems research was generally in the form of researcher designed and farmer managed cropping pattern trials. Participation of farmers ranged from their labour contributions in trials conducted on their fields to the inclusion of farmer feedback in both *ex ante* and *ex post* technology evaluations. Cropping pattern trials by IRRI researchers largely ceased by 1991 in favour of more farmer-participatory and farmer relevant research (Fujisaka, 1989a, 1991b).

Research by Rice Environment: A Farmer First Stage

During the mid-1980s, IRRI researchers and the CG system became increasingly concerned with sustainability and equity issues. A 'matrix' structure was implemented in 1990 in which research divisions (e.g. agronomy-physiology-agroecology, entomology) formed one axis and the irrigated, rainfed lowland, upland, and deepwater and tidal wetland (and cross-ecosystems) rice environments formed another. Research was conducted within defined projects and programmes, with members of many projects forming into multidisciplinary teams.

The issue of equity was addressed because research resources were then specifically allocated to the unfavourable rice agroecosystems in which many of Asia's poor producers and consumers live. Sustainability was addressed in terms of both long term sustainability of the resource base (e.g. research on land management in the uplands) and in terms of sustaining past yield gains made in irrigated environments (Pingali, 1991). For IRRI, on-farm multidisciplinary team research (with an agricultural anthropologist on the team) marked this stage.

Farmer-to-farmer training, farmer-participatory research, farmer experiments, and consideration of farmer practice and technical knowledge were components of research at this stage. Some examples of such research include:

- *Farmer technology adaptation and adoption.* After farmer-to-farmer training, farmers at an upland site in the Philippines adapted and adopted contour hedgerows over a period of four years. They developed hedgerow establishment methods that required less labour, eliminated grasses that were too competitive with crops, stopped planting trees that were initially intended to produce green manures and planted species that might provide cash returns. The systems they developed controlled soil erosion equally effectively. Farmers who learnt about the technology, but who did not establish hedgerows were those who had higher proportions of flat land and/or off-farm or non-farm income opportunities. Farmer technology adaptations are being fed back into the on-farm research at the site (Fujisaka, 1989b).

- *Research to transfer a farmer technology.* Farmers in Tupi, South Cotabato, Philippines, grow rice and maize in an upland environment characterised by favourable soils and slope, but risky rainfall. Rice production features two innovations: use of both stable-yielding traditional upland and higher yielding but disease susceptible modern lowland rice varieties, and development and refinement of implements and management practices for land preparation, seeding, weed control, and for reducing turn-around time between crops. Costs, benefits, and reasons underlying farmer-developed alternative strategies were examined. The farmers' *panudling*, a five-tined furrow opener and interrow cultivator, combined with broadcast seeding are being farmer-to-farmer introduced and tested in other upland rice areas (Fujisaka, forthcoming; Go and Go, 1993).

- *Dropping cropping systems research.* Cropping systems research was conducted to improve productivity in the same area. Farmers rejected introduced patterns. Farmers' cropping patterns were examined in terms of cost-benefits and in terms of farmers' reasons underlying crop and pattern choices. A conclusion was that an approach that starts with understanding farmers' systems in order to conduct research on the weak points of such systems, together with evaluation of farmer technology and adaptation, may be more effective than researcher-designed, farmer-implemented cropping pattern trials (Fujisaka, 1991a).

- *Farmers' dry seeded rice.* A variety of traditional rainfed, lowland dry-seeded rice systems were examined in Myanmar, Indonesia, and India. Farmers' practices were well matched to field environments and included ways to address not only weeds, but also poor soil physical properties, water deficit and excess, and poor plant stand. Among others, farmers used pigmented rice cultivars to rogue wild rice or rotated or switched from dry seeded to transplanted rice due to weeds or a too rapid onset of rains. Redistribution of seedlings and manual weeding were used to improve plant stand and soil physical properties – in addition to reducing weeds. Farmers' dry seeding systems did not necessarily reduce labour, but could increase cropping intensity, result in stable yields using low material inputs, or distribute labour demands where some fields are dry seeded and others transplanted. Because of difficult and uncertain environmental conditions, IRRI's research on direct dry seeding now builds upon farmer practice.

- *Farmers' rejection of a recommendation.* Since 1982, the Philippines recommended that rice farmers apply ½ of their nitrogen fertiliser (N) 'basally' to drained fields prior to final harrowing and transplanting, and the rest at panicle initiation. Few farmers apply N basally, however. More than 200 farmers in three irrigated areas were interviewed about their rice crop management for wet seasons 1990 and 1991. Farmers continually adjust practices to fit their field conditions; and, overall, these practices agree with research suggesting that yields do not increase with basal-N applications, and that N is optimally applied at mid-tillering and panicle initiation. This led to a review of research, leading to the basal-N recommendation. The need to understand farmer practices inconsistent with recommendations was reinforced.

- *Farmers' traditional rices.* Upland farmers in part of Bukidnon, Philippines, grow local rice cultivars, mainly *Dinorado*, along with some 17 others. Farmers in Claveria grow local cultivars (mainly *Speaker*) and the improved UPLRi5. Unlike in the irrigated lowlands, 'modern' varieties were not adopted. As expected, farmers seek high yield, moderate duration, eating quality, no lodging, and disease and drought resistance. But farmer evaluations of negative traits indicated that there were other important selection criteria, such as awns which make handling difficult, hardening of cooked leftovers, taste loss with storage, and exposed panicles or earlier grain development which lead to more bird losses. International programmes for upland rice have now shifted their strategy from *Indica* to *Japonica* based breeding, while farmers' cultivars and knowledge are now considered a major resource for national programmes. Many traditional (*Japonica*) cultivars selected by farmers to suit local conditions can provide needed parent materials, while farmers' criteria are increasingly being included as breeding targets (Fujisaka *et al*, 1992b).

Other efforts which involve better farmer participation from the initial research stages include testing of rainfed lowland rice varieties (Chaudhary and Fujisaka, 1992), work to improve on-farm reservoirs in rainfed lowland areas (Guerra et al, 1990), farmer testing of no-spraying for 40 days after transplanting of irrigated rice in Vietnam and the Philippines as a simplified Integrated Pest management (IPM) method (Fujisaka *et al*, 1992a), and building on farmer rice seed selection practices to reduce weed seed contamination.

Farmer-oriented diagnostic surveys attempting to identify and prioritise both problems and potential research solutions were developed, and applied to various systems including shifting cultivation, and the rice-wheat system of south Asia (Fujisaka, 1991c; Harrington *et al*, 1990).

These surveys were conducted by teams of IRRI and national scientists, were conducted in farmers' fields and relied upon simple ethnographic methods, secondary data, and field monitoring. Agroecosystems analysis to extrapolate technologies was also developed and applied at this stage (ARFSN, 1990).

The Emerging Scenario at IRRI

A fourth stage is emerging at IRRI, driven by the CG system and Technical Advisory Committee (TAC). Key concepts in the emerging rhetoric of the international centres are 'upstream' and 'strategic' research to be conducted by IRRI; a wider definition of National Agricultural Research Systems (NARSs) to include universities, NGOs, and others (these are collectively now known as 'stakeholders'); stakeholders as equal collaborators in research; and, at the same time, a move towards 'ecoregional', rather than commodity-based, research.

In response to these shifts in 'mandate', the current scenario at IRRI is to emphasise such supposedly strategic and more basic approaches as biotechnology, geographic information systems (GIS), and modelling. IRRI would attempt to work with strong national programmes via collaborative arrangements (i.e. via consortia of partners rather than IRRI-led networks). The scenario assumes that national programmes will conduct the necessary more applied and adaptive research, including on-farm and farmer-participatory research. As a result, such research conducted directly by IRRI researchers is tacitly discouraged.

Finally, IRRI and other centres are responding to a recommendation by the TAC to shift to the conduct of ecoregional rather than commodity-oriented research. For IRRI, the shift would require much greater collaboration with other CG centres (e.g. with CIMMYT on the rice-wheat system, with ICRISAT on tropical legumes in rice systems, and with ICRAF on trees in upland rice systems). The shift could also push IRRI's return to more basic rice germplasm improvement, as other centres and national programmes are given the responsibility to conduct more of the needed on-farm, systems, and farmer-participatory research.

The Current Scenario at Some Other CG Centres: More Farmer Participation?

Researchers at the Maize and Wheat Improvement Center (CIMMYT), the International Centre for Research in Agroforestry (ICRAF), the West Africa Rice Development Association (WARDA), and the International Potato Centre (CIP) responded to a request sent to all CG centres to briefly discuss farmer participatory methods used at their centres. This is a review of their activities.

Table 1. Four research stages* at IRRI and respective farmer participation

Stage Concerns	Participants and farmer participation
Germplasm improvement	• increase rice yields through new varieties • breeders, geneticists, pathologists • farmers receive varieties; and germplasm collected from farmers
Cropping/farming systems	• increase productivity of rice-based systems • add agronomists, economists and others • researcher designed & farmer-managed trials, farmer *ex post* feedback on technologies
Environmental	• address issues of sustainability of production in favourable environments and sustainability of less favourable rice agroecosystems; work in less favourable environments to address equity concerns • add agroecosystems analysis, modelling, GIS • on-farm inter-disciplinary research teams • substantial farmer participation in farmer-to-farmer training, farmer participatory experiments and farmer experiments; especially in knowledge-intensive technologies
Upstream & Institutional	• need to focus on strategic & basic research; national programmes conduct applied or adaptive research; collaborative work via Consortia with strong national programmes; possible ecoregional directions • biotechnology, modelling, GIS, policy • less emphasis on on-farm farmer participatory research; farmer participation possibly in resource management, IPM, and in developing non-yield germplasm improvements.

* *With thanks to Roades (1988).*

CIMMYT

Farmer participatory methods at CIMMYT evolved from on-farm and farming systems research and are effective in initially narrowing alternative interventions to those with the greatest potential for adoption. Research includes farmer participatory experiments to elicit assessments of green manure relay cropping in maize and farmer-to-farmer extension methods in southern Mexico, and farmer adaptation of wheat production technologies to widely varying environments. Participatory diagnosis has been used in CIMMYT-IRRI-NARS research on rice-wheat systems in South Asia. As is also the case at IRRI, on-farm researchers recognise the utility of early farmer germplasm assessment in the process of germplasm improvement. Scientists predict that farmer participatory methods will become more important over the next ten years, especially in crop management research, research on natural resource conservation and management and germplasm improvement activities aimed at non-yield and other non-conventional characteristics (Larry Harrington, personal communication).

ICRAF

ICRAF scientists say that farmer participatory methods have a critical role to play in all stages of the research process, i.e. in diagnosis, design, testing, and evaluation. A major challenge is making participatory research more 'rigorous' in order to improve the accuracy, precision, and predictive power of results and to thereby strengthen credibility among colleagues and donors. In evaluation, for example, researchers are using methods from social psychology and consumer marketing research to elicit farmers' criteria for evaluating tree species. Overall, researchers are optimistic that incorporating farmers' perspectives into research will *increase* in importance in the CG system, even if the term FSR does not (Steve Franzel, personal communication).

WARDA

WARDA researchers are equally optimistic: farmer participatory approaches were adopted in the face of earlier non-adoption of 'improved' technologies; and such research will continue to be important. The highest payoffs will be in modifying research to address client objectives from the outset. Current returns have been high where on-farm technology testing has allowed non-existent or weak extension services to be bypassed. WARDA researchers feel that such impacts will be lasting, that everyone is 'jumping on the bandwagon', and that opposition to such approaches are no longer apparent in Africa (Peter Matlon, personal communication).

CIP

In the late 1970s, CIP compared the narrow technology-focused approach to farmer participatory methods via a special FSR project. The mainstream FSR approach developed a large team and complex research agendas; used over 80% of the budget; and learned lessons from poor research designs and false assumptions about farmer technology. The participatory approach emphasised interdisciplinary cooperation of social and biological scientists and the close involvement of technology users in the process – from problem definition to evaluation of technology options; spent less than 20% of the budget; and identified a potato storage technique known to both science and farmers, and successfully supported its diffusion as a means to improve the quality of seed potatoes. As a result, CIP's narrower FSR programme wilted, while the participatory approach received the blessing of the institution (Gordon Prain, personal communication).

Despite the positive prognoses about the future of farmer participatory research given by a number of scientists in the CG system, such 'downstream' research is threatened in many Centres under the present (selected) funding and policy climate of the CGIAR. Currently, there is an infatuation with biotechnology as a top-down cure-all, and several donors have pushed for more 'strategic' and less adaptive research at the international level. Thus, pressure against participatory approaches is coming from both scientists wanting to expand the role of biotechnology and from management looking at which way donor winds are blowing. As an answer, participatory approaches need to achieve tangible successes which can be directly related to the involvement of local people. Those active in participatory approaches within the CG need to seek close links with NGOs to help ensure that both technical and political/policy issues can be addressed.

Table 2 lists centres, their founding dates, the percentage of the CGIAR core budget each receives, and my additional impressions regarding what is going on at each centre in terms of farmer participatory work.

Table 2. CG Centres, year founded (to 1990)*, slice of the pie (1990), anthropologists, and farmer participation

Centre	Year Founded	% of CG funds (1990)	Comments
ICRISAT	1972	13.3	-Mainly commodity research on sorghum, millet, chickpea, pigeonpea, groundnut; economists, no anthropologists; evaluation of end-user systems at technology evaluation stage.
IRRI	1960	12.5	- Rice and rice systems; anthropologists; farmer participation in on farm-research, IPM.
CIAT	1967	11.7	- Lowland tropical agriculture; rice, beans, cassava. Farmer forages; anthropologists and farmer participation in Latin America and Africa.
CIMMYT	1966	11.4	-Maize, wheat, barley, triticale; agricultural economists and others

			doing good on-farm work with farmers.
IITA	1967	9.5	- Crop improvement, land management in humid, sub-humid tropics; maize, cassava, cowpea, plantain, soybean, rice, yam; economists do on-farm work with farmers.
ILCA	1974	8.5	- Livestock, sub-Saharan Africa; FSR involves farmers; anthropologists.
ICARDA	1975	7.9	- FSR in north Africa & west Asia
CIP	1970	7.1	- Potato & root crops; started 'farmer-back-to- farmer'; reduced agricultural anthropology since Rhoades' days in 1970s-80s.
ILRAD	1973	5.7	- Livestock diseases in sub-Saharan Africa.
IFPRI	1975	3.8	- Economists in Washington working on policy.
IBPGR	1974	2.9	- Conservation of genetic resources.
ISNAR	1980	2.9	- Social sciences in the Hague; strengthen NARS.
WARDA	1970	2.6	- Rice improvement in west Africa..
AVRDC	1971		- Vegetables in Asia.
ICLARM	1977		- Fisheries and aquaculture; now building a social sciences programme.
ICRAF	1977		- Agroforestry; diagnosis & design
IIMI	1984		- better management of irrigation systems.
INIBAP	1984		- Bananas & plantains; in France; plans to develop regional on-farm teams.

Conclusions

Farmer participation in agricultural research from the initial stages onwards continues to be needed and appears to have the greatest likelihood of being continued at the CG centres in crop management research, especially where technologies are knowledge intensive (such as integrated pest management or adaptation of wheat to new environments); in research on natural resource conservation and management and germplasm improvement activities aimed at non-yield and other non-conventional characteristics. But the likelihood of these approaches continuing to be of importance at the CG centres will depend on tangible successes directly stemming from the participation of farmers and other ‘users’.

Shrinking budgets have led many to conclude that the various players in agricultural research need to act according to their respective comparative advantage. For IARCs in places where the NARS are relatively weak (e.g. parts of Africa), this appears to mean *increases* in farmer participatory research conducted by CG centre researchers. On the other hand, and as a result of recommendations by the CG system and TAC, IRRI may be exiting from a stage of substantial on-farm and farmer participatory research in favour of such activities as plant breeding and biotechnology to improve the basic rice germplasm, agronomy to address a possible yield decline in irrigated rice, modelling to quantify the behaviour of rice ecosystems, and GIS to characterise agroecological zones and define extrapolation domains.

For IRRI, these changes need to be accompanied by increased and better collaboration with strong national research programmes and with other IARCs. But which, if any, national programmes have a comparative advantage in working with farmers? Our experience with NARS (most often government departments of agriculture) has revealed a general reluctance to involve farmers until technologies are ‘proven’. That is, many of IRRI’s partners have preferred to set up more ‘top down’ demonstrations after lengthy on-station testing, rather than involving farmers as research partners from the onset of research (Fujisaka and Garrity, 1991). In sum, the challenge is that if IRRI is to move ‘upstream’, some way must be found to increase the efforts of national rice research institutes – including universities and NGOs – to incorporate farmers in agricultural problem solving.

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