

Issues and Options for Social Scientists in Germplasm-Oriented Research

Derek Byerlee, CIMMYT, Mexico

The CG system broadly distinguishes between activities aimed at conserving, improving and distributing germplasm and activities aimed at crop management and conservation of the natural resource base. There is now discussion of the possibility that some centers will specialize in one of these activities. Some assume that the social scientist's role will be relatively greater in the resource-oriented or ecoregional centers, since socio-economic analysis and appropriate institutions and policies are expected to play a greater role in the design and successful adoption of resource-conservation strategies. While I generally agree with this perspective, I also feel strongly that we must ensure a strong social science presence in germplasm-related activities. Social science analysis is not only important to developing varieties appropriate to the needs of small farmers, but it must also grapple with a new set of institutional and equity issues being raised by the expanding role of biotechnology, genetic diversity and intellectual property rights. The following notes briefly outline some observations on the past role of social scientists in germplasm development activities, and introduce options for the future.

The Role of Social Scientists in Agricultural Research Institutes

The role of social scientists in a research institute emphasizing germplasm-related activities (GRCs) closely follows the general role for social scientists in research programs aimed at developing improved technologies. These activities are aimed at improving the efficiency of resources expended in

research to develop new technologies--either internal efficiency in terms of the use of research resources to better meet the objectives of the research program in developing new technologies, or external efficiency in terms of removal of barriers to the wider use of new technologies (Byerlee and Franzel, 1990). These activities can be further classified into three general levels, each with its own clients or users (Table 1).

1. **Technology design, evaluation and utilization:** This level deals with all those activities that have to do with technology generation and adoption. The most important activity for social scientists is to participate *ex-ante* in the design and evaluation of technologies to ensure that social and economic perspectives (whether from the point of view of farmers or society) are adequately addressed in the research decision making process. *Ex-post* studies of technology adoption, to feed back information to technical scientists, are also often useful and in some cases where there is non-adoption of what seems to be an appropriate technology, analysis of input supply and other policy constraints may also be undertaken. In any case, the major user of social science analysis in these activities is the technical scientist charged with developing new technologies.
2. **Research Resource Allocation and Impacts:** This type of social science research is undertaken primarily for research managers in order to improve efficiency of the overall research program and to provide information to those who fund research. Activities include analysis of the allocation of research resources across different research activities, as well as impact studies (including adoption studies) undertaken for the purpose of documenting research payoffs and justifying research expenditures. Some

of this work may be primarily oriented toward technical scientists, if the major objective is to improve efficiency in technology generation--for example, through a more efficient breeding approach to achieve a given objective.

3. **Commodity sector analysis:** This work is not aimed at specific decision makers, but rather aims to provide a general overview of the environment in which various types of research decisions must be made. Examples of this work are the analysis of supply and demand trends for a specific commodity, which may be useful to individual researchers (for example, the decision on whether to develop a variety suited to a particular type of utilization) or to managers (for example, the relative emphasis to place on a specific commodity compared to others in light of future supply and demand trends).

Some observations about social scientists in germplasm research in the IARCs

My general impression is that social scientists in IARCs with a germplasm mandate have over-invested in some types of activities relative to others. I have not tried to conduct a detailed literature search, but based on casual observation and visits to most of the IARCs, I would submit the following observations.

1. Even in IARCs that emphasize germplasm research, a lot of the effort of the Ss has been oriented toward crop and resource management research (CRMR). For example, at CIMMYT we have invested a great deal in developing and disseminating methods for FSR, some of which has to do with variety development (see below), but much of which deals with issues

of soil fertility, pest control, tillage and plant population. Even now we are investing quite substantially in research on resource conservation in systems as varied as hillsides maize systems of Central America and the intensive irrigated rice-wheat systems of Asia. Similarly SSs in other commodity-based centers, such as IRRI, have often given more attention to CRMR than to plant breeding.

2. On the whole SSs have conducted relatively little interdisciplinary research in close collaboration with plant breeders or other disciplines associated with varietal development (such as plant pathology). Much of the work in the two centers, CIMMYT and IRRI, which have had the largest impacts on diffusion of modern varieties (MVs), has been *ex-post* assessments of the benefits of the adoption of MVs, especially in light of the criticism by some of the adverse impacts of the MVs on income distribution. Relatively little of this work has been oriented toward feeding back information to center breeding priorities. Of course, the FSR work in which practically all the centers have been involved has often identified useful information on desirable variety traits for small farmers (Haugerud and Collinson, 1990). However, since FSR is often not well linked to commodity research programs, it is not clear how this information, which is often quite site-specific, can be aggregated and utilized in setting priorities for centers with a *global* mandate for germplasm research on a specific commodity. Of course, some of the site-specific findings of FSR have important implications for breeding priorities of the centers. A good example is the recent ICRISAT work on the value of crop residues of sorghum as a fodder in India, and the careful evaluation of the performance of sorghum and millet varieties under farmers' conditions in the Sahel. Likewise, the results

of FSR work (including research emphasizing farmers' direct participation in technology selection) in Eastern and Southern Africa is increasingly being used by maize and bean breeding programs in the region (Haugerud and Collinson, 1990; Sperling et al., 1992).

3. We have also done very little work on breeding strategies and efficiency of resource use in crop breeding programs. For example, there is surprisingly little good research on the cost-effectiveness of increasing productivity through breeding for low input conditions versus changing input levels. Another important issue is the international division of labour in plant breeding, especially for the smaller NARSs--that is, what is the value of local adaptation of center materials by NARSs in relation to the cost of that adaptive breeding relative to screening of imported varieties (e.g., Brennan, 1992). A related issue is the possibility of increasing the efficiency of breeding programs through on-station varietal selection by farmers (Sperling et al.). Finally given the considerable expenditure on plant breeding in the CG and in NARSs (typically about half of all research expenditures of the IARCs and NARSs), there has not been any effort to date to model alternative plant breeding strategies/ programs in economic terms, with a measurable set of inputs and outputs and an array of techniques from which to choose.

New Opportunities for Social Scientists in Germplasm Research at IARCs

The changing climate for agricultural research at the international level poses new challenges for the CG which will become an important part of the

agenda of SSs in germplasm research at IARCs. These changes, which are closely interrelated, include the following:

1. The emergence of new biotechnological tools to improve the efficiency of conventional plant breeding and also to allow the transfer of alien and novel genes into crop species. These technologies, which are beginning to have commercial payoffs in industrialized countries, increase the fixed costs of varietal development (at least initially), and widen the options for plant breeders. There is much concern that these new technologies will have adverse effects on small farmers and rural laborers (e.g., through transfer of herbicide resistance gene to cereal crops). Therefore SSs have an important role in setting the priorities for this research and for conducting *ex-ante* assessment of the likely consequences.
2. The growing privatization of research in both developing and industrialized countries, in the latter case stimulated by the extension of intellectual property rights (IPR) to biological organisms and processes. Consequently much of the research on the new biotechnologies is taking place in the private sector in industrialized countries. Many see the IARCs as one conduit for the transfer of this technology to the developing countries. Even in developing countries, the growing importance of hybrid seed for many food crops (maize, sorghum, millet and, recently, rice), means that private sector research on basic food staples is expanding rapidly, even without the benefits of IPR. These changes have implications for social science research. For example, in the future SSs may be called upon to place economic values on specific genetic traits available for purchasing from the private sector.

3. Concern about genetic diversity and the need to conserve germplasm resources and enhance diversity in farmers' fields. The recent Earth Summit in Brazil has highlighted the lack of consensus on economic and equity issues associated with biodiversity. However, several mainstream economists have started work on analyzing economic tradeoffs in conservation of genetic resources and it is likely that this work will have spin-offs to the types of questions facing IARCs.

At the same time as the above challenges are emerging, there is growing pressure on CG budgets. This means that SSs in CG centers are being called upon for more detailed studies on priorities, in order to guide center resource allocation. Donors are also asking for more accountability and this implies that SSs invest more time in impact studies, and in public awareness issues. Hence one of the major challenges for SSs in IARCs in the next few years will be to strengthen the resource base in social science analysis and balance their activities between (a) field level activities to promote a "users' perspective" in technology design, (b) new activities associated with the evolution of research technologies and IPRs at the global level and (c) serving the needs of management in an era of shrinking research budgets.

Organizational Issues

With the changes in the mix of activities to be addressed by CG SSs and the changes in the CG system itself, there are a number of organizational issues that we might discuss with respect to SSs in germplasm research at IARCs.

1. Will we need more specialization of SSs by subdiscipline? For example, can we expect the same SSs that carry out field level FSR-type work to also conduct social science analysis of the expected impacts of the new biotechnologies?
2. How can we improve the linkages with plant breeders to provide an *ex-ante* perspective in technology design? Have we now established ourselves sufficiently to avoid the problems of the Green Revolution period when the SSs were called in after the widespread diffusion of the MVs had taken place, in order to "keep the score"?
3. Can we realistically divorce the work of SSs in germplasm research from those working in ecoregional centers? Much, if not all, germplasm research interacts with crop management and environmental concerns and there is growing evidence of the special needs for improved varieties to fit "sustainable systems" (Sleper et al., 1991).
4. What is the appropriate division of labour for SSs in NARS and SSs in IARCs? One of the disappointments of the last two decades has been the lack of development of strong social science capacity in NARSs to undertake interdisciplinary research on the wide range of issues associated with technical change. This situation contrasts with the relatively successful development of capacity in many countries to undertake more conventional economics research related to agricultural policy. In many ways the CG SSs are also the SSs to the NARSs.

5. **How can we enhance the linkages among SSs working in germplasm-related activities at the various CG centers? Many of the analytical methods employed will be common across commodities.**

References

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Table 1. Research activities and clients of social science research in IARCs with a commodity mandate

	IARCS			National Programs				Donors
	Crop program scientists	Crop program managers	Director general's office	Social scientists	Crop programs	Research managers	Policy makers	
Technology design, evaluation, and utilization	***	.	.	***	***	.	.	
Resource allocation and impacts	.	**	***	**	.	**	**	**
Commodity sector analysis	**	**	**	**	**	**	**	**

***= major client; **= intermediate client; .= minor client.

Source: Byerlee and Franzel (1990).