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Social Science Contributions to Bean/Cowpea CRSP Research: Profits and Potentials

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Each CRSP has a different organizational history and structure that has shaped the goals and strategies of its overall program and its social science component. This chapter describes the policy context in which the Bean/Cowpea CRSP was initiated, and how this context led to a strong social science focus on women in development (WID). The structure of the socioeconomics component and its research and training accomplishments to date are then highlighted. Finally, relationships among different kinds of socioeconomic research on this CRSP are explored.

POLICY CONTEXT AT THE PLANNING STAGE

The planning stage of the Bean/Cowpea CRSP took place during 1978 and 1979, at the height of the New Directions or basic human needs approach to U.S. foreign aid (DeWalt this volume). This orientation to development was an outgrowth of the 1973 Foreign Assistance Act, which targeted the needs of the poor in developing countries. The act specified that U.S. bilateral economic aid should support host country government undertakings directly aimed at improving the lives of the country's poorest citizens. The legislation thus emphasized microlevel projects that focused on small-farm labor-intensive agriculture and equity in income distribution, rather than macroeconomic instrumentalities and planning.

A key component of the new legislation was the 1973 Percy amendment, which directed that U.S. bilateral assistance "be administered so as to give particular attention to those programs, projects and activities which tend to integrate women into the national economies of foreign countries, thus improving their status and assisting the total development effort" (USAID 1982:2). Title XII of the International Development and Food Assistance Act ("Famine Prevention and Freedom from Hunger"), under which the CRSPs were initiated, reflects the channeling of develop-

ment efforts toward poor, small-scale farmers and women in developing countries.

Development initiatives for these groups found a receptive audience at Michigan State University (MSU), the planning entity of the Bean/Cowpea CRSP.¹ In the late 1970s, MSU's Office of Women in International Development had established an active Project Advisement Task Force (PATF) to encourage women's participation in development and to provide input on gender issues to university personnel involved in project design and implementation. This task force was composed of researchers and students from the social sciences, liberal arts, natural sciences, human ecology, and nutrition. Encouraged by the WID policy, the biological scientists responsible for the planning grant included three PATF members in program planning—a psychologist, a rural sociologist, and a home economist. One of the PATF members became the first deputy director of the CRSP; in 1983, she was appointed director.²

Thus, in the policy sphere, the macrolevel parameters guiding the design of the Bean/Cowpea CRSP were set by the New Directions mandate, the Title XII legislation, and the Percy amendment. At the local level, MSU's Office of Women in International Development, through the PATF, was in a position to collaborate with the biological scientists responsible for program planning and to give the CRSP a strong WID focus. Implicit in this focus was the recognition that attaining the CRSP goal of reducing hunger by increasing the production and utilization of beans and cowpeas required research and technology development directed at women, since they are the principal producers of legumes in many DCs. The WID focus has also stimulated the active and sustained involvement of both U.S. and host country women in CRSP research and training program.

STRUCTURE OF SOCIAL SCIENCE IN THE BEAN/COWPEA CRSP

The socioeconomic component of the Bean/Cowpea CRSP is a small but nonetheless influential part of the program. As of 1987, three of 13 existing projects included social science or agricultural economics research. The majority of the 13 projects focus on limitations to bean and cowpea production imposed by insects, diseases, the physical environment, plant responses, or constraints in the areas of nutrition, food preparation, and storage. The three projects involving socioeconomic research are briefly described below.

1. "Breeding Beans for Disease, Insect, and Stress Resistance, and Determination of the Socioeconomic Impact on Smallholder Farm Families

in Tanzania." Washington State University and Sokoine University of Agriculture in Tanzania are collaborating in this multifaceted project; it incorporates a wide range of factors into its bean breeding program.³ Among these are insect and disease resistance, high nitrogen-fixing capacity, ease of cooking, and nutritional criteria. Under the direction of an agricultural economist, the socioeconomic component has played an important role in establishing the research agenda. For example, it has brought to the attention of plant breeders factors such as regional variation in types of bean cultivars preferred for consumption and sale. Two primary research focuses are monitoring the impact of project innovations on smallholders and crop marketing. Studies are also under way on seed production and distribution networks. Throughout, particular attention is accorded to women, since they are the major producers, processors, and marketers of beans in Tanzania.

2. "Genetic, Agronomic, and Sociocultural Analysis of Diversity Among Bean Landraces in Malawi." This project is directed by MSU in collaboration with Bunda College of Agriculture.⁴ It combines cross-disciplinary investigations of the generation, maintenance, and utilization of bean landraces in Malawi. Issues addressed include genetic and sociocultural factors affecting the generation and preservation or loss of genetic diversity, acceptance criteria for introducing improved bean cultivars, and the relative benefits to farmers growing pure lines versus mixtures. A primary focus of the socioeconomic research has been women's roles in the generation and maintenance of landraces.

3. "Appropriate Technology for Cowpea Preservation and Processing and a Study of its Socioeconomic Impact on Rural Populations in Nigeria." This food technology and nutrition project is directed by the University of Georgia in collaboration with the University of Nigeria, Nsukka.⁵ The goal is to increase the utilization of cowpeas by developing new technologies (including storage methods and processing equipment) and by improving the nutritional value and safety of cowpea products. A major research thrust has been the design of a village-level processing mill to produce cowpea meal. Survey researchers and social scientists at the University of Nigeria have participated in the research process and are expected to play an important role in evaluating the success of the new technology.

During the initial 5-year grant period (1980-1985) of the Bean/Cowpea CRSP, there were two additional social-science-related projects. One consisted of an FSR component on a plant-breeding project in Guatemala. Unfortunately, this was never fully initiated because of human rights abuses and safety concerns about researchers in highland Guatemala. The other was an FSR project in Ecuador that had a strong social science orientation (Uquillas and Garrett this volume). Essentially, then, over the life of the

program there have been five projects with socioeconomic focuses, three of which are ongoing as of the late 1980s.

Social scientists have also participated at the program, as well as the project, level. Since its inception, the Bean/Cowpea CRSP ME has employed a WID specialist to provide project investigators with information on the social organization of agriculture in the host countries for use in setting research agendas;⁶ suggest potential consequences of technological changes introduced by the CRSP; foster research linkages between social and nonsocial (biological, food technology, and nutrition) scientists; establish ties between project researchers and host country women's groups and organizations; and encourage the inclusion of women and of gender issues in the Bean/Cowpea CRSP's student training program.

Both the WID specialist⁷ and the Bean/Cowpea CRSP director are social scientists. Positioning social scientists at the management office and directorship levels has had a significant impact on the program as a whole. Their presence has made socioeconomic research contributions more visible and comprehensible than might otherwise have been the case. It also has encouraged CRSP biological research to address the needs of smallholders and women more directly. Attention to these groups has been further reinforced by the External Evaluation Panel, two of whose members from 1980 through 1986 were agricultural economists. Thus, although the socioeconomic component is small in comparison to the research efforts and resources devoted to the production disciplines, it has nonetheless played an important role in orienting overall research agendas.

TYPES OF SOCIAL SCIENCE AND AGRICULTURAL ECONOMICS RESEARCH

As indicated above, there are no freestanding social science or agricultural economics projects on the Bean/Cowpea CRSP. All social scientists and agricultural economists on this CRSP have worked in close collaboration with biological scientists, food technologists, or nutritionists. The multidisciplinary and applied intertwining of these disciplines has implications for the nature of the research conducted.

Specifically, socioeconomic researchers have made two types of contributions as part of agricultural R&D teams. The first - which DeWalt (this volume) terms the social science *of* agricultural development - provides new knowledge and understanding in its own right about farming systems and agricultural transformations. It examines how changes in, e.g., land-tenure practices, labor patterns, and agricultural credit and pricing policies can lead to increased stratification among smallholders, and what the implications of this differentiation are for food crop production and agricultural development.

The second contribution—what DeWalt calls social science *in* agricultural development—provides data on the social and economic organization of agriculture that have immediate implications for the development of new or improved agricultural technologies. Here, research parameters and activities usually center on variables identified by the participating scientists as constraints on increasing or stabilizing production and utilization of food crops.

In both cases, the purpose is to generate and use scientific knowledge in a specific problem-solving context. In this sense, these contributions are forms of applied research. Although the work of Bean/Cowpea CRSP social scientists and agricultural economists is often informed by basic disciplinary research, this CRSP has provided little opportunity for them to conduct fundamental studies, the principal aim of which is to test and advance theoretical propositions and generalizations in particular fields of knowledge (Brush 1986).

Socioeconomic researchers were initially recruited into the Bean/Cowpea CRSP because they possessed specific skills that biological scientists recognized as useful for achieving project and program goals. Such skills included experience in collecting baseline data to permit the measurement of project impact, and knowledge of cultural or ethnic perspectives that could affect the adoption of project innovations. While this service-oriented role was the entry point for socioeconomic researchers on the CRSP, the collaborative nature of the work increased all CRSP scientists' understanding of the richness and potential contributions of one another's disciplines. This in turn allowed some expansion of socioeconomic research agendas. While these usually still have an applied orientation, they have nevertheless gone beyond the confines of baseline data collection and impact monitoring to incorporate the study of socioeconomic and cultural variables shaping the agricultural sector and hence influencing project goals.⁸

RESEARCH ACHIEVEMENTS

Social science and agricultural economics research results for the initial five-year grant period are outgrowths of primary field investigations in Malawi, Tanzania, Ecuador, and Nigeria and of secondary literature searches on these countries plus Botswana, Cameroon, and Guatemala.⁹ Two principal types of findings and contributions are discussed: first, studies of socioeconomic and cultural variables that influence the production and utilization of beans and cowpeas, including land-tenure patterns and size of land holdings, labor issues, and agricultural pricing policies, marketing structures, and foreign-exchange considerations; second, baseline studies and social science and agricultural economics contributions to agricultural research on plant breeding, crop management and economics, and technology development.

Studies of Socioeconomic and Cultural Constraints to Production

Land-tenure patterns and size of holdings. Size of land holding is an important consideration in farm production and management practices. In all the countries studied, small-scale farmers, especially women, produce a major portion of the food crops, including beans and cowpeas. However, in many of these areas, the land holdings needed for this production have been declining in size. In the mountainous northern region of Malawi, for example, where population pressure is high and cash cropping of coffee is prevalent, the average amount of land per person has decreased by almost 25% between 1968 and 1980 (Barnes-McConnell 1986). Such changes have implications for the quantity of food crops grown and for human nutritional status; hence they are significant constraints to bean and cowpea production in their own right.

Work in Ecuador on land tenure arrangements and size of land holdings has highlighted the need to differentiate among categories of smallholders in designing new or improved agricultural technologies. Project investigators have developed a microcomputer program to measure the degree of inequality in land holdings (Garrett, Golden, and Francis 1986). In one of the Ecuadorian study sites, for example, researchers found that many smallholders were nearly landless. These farmers received most of their income not from agriculture, but from off-farm employment. Other rural residents in this area were entirely dependent on wage work. This stratification within the small-farm category has many implications for the development of agricultural innovations; it must therefore be taken into account from the outset of research. For example, new labor saving technologies that displace workers are often harmful to landless or land poor families, even though these same technologies may benefit those who hire workers (Garrett 1986a,b,c). Thus, the impact of new or improved technologies or varieties is likely to vary by smallholder strata.

Labor considerations. Small farming households in many developing countries are directly caught up in and respond to events in the national and international economies. We have emphasized such micro/macrolevel relationships in studies of labor utilization patterns on small farms. For example, an extensive literature review of the small-farm sector in Botswana indicated that out-migration of men to work in the mines and cities of South Africa has resulted in a high percentage of female-headed households (Horn and Nkambule-Kanyima 1984). Male out-migration is also significant in other Bean/Cowpea CRSP countries, especially Malawi (Barnes-McConnell 1986) and northern Cameroon (Ferguson and Horn 1985). This trend can impact farming strategies, sometimes leading to a reduction in the area cultivated or a change in crop mix (Horn and Nkambule-Kanyima 1984;

Ferguson and Horn 1984). The feminization of farming also has implications for the development of new bean and cowpea varieties and technologies.

Most of the CRSP's socioeconomic studies of labor utilization have examined regional and local levels with regard to two interrelated concerns: variations in labor demands by season, and inter- and intrahousehold dynamics. The WID orientation of the participating researchers has stimulated a particular interest in the intrahousehold division of labor. Extensive data on this topic have been gathered in Malawi, Tanzania, and Ecuador; secondary data searches have been undertaken for Guatemala, Cameroon, and Botswana (Due, White, and Rocke 1985; Ferguson and Horn 1985). Researchers have called attention to the need to move beyond popular general conceptualizations of "the farm family" in the agricultural sciences and to focus instead on intrahousehold dynamics. For example, in constructing a farming systems methodology, project investigators in Ecuador incorporated the basic social science insight that the division of labor by gender and age within households varies by social stratum, ethnic group, and region.

Agricultural pricing policies, marketing structures, and foreign exchange. Food-pricing policies and marketing structures have a direct impact on the production of beans, cowpeas, and other food crops. In Tanzania, research indicates that policies designed to placate vocal urban consumers by keeping food prices low resulted in less food for the market. Per capita agricultural production is therefore falling (Due 1986). In contrast, the government in Malawi significantly raised producer prices for maize in 1981-1982, with the result that smallholders produced a record harvest, and the country became a net food exporter (Barnes-McConnell 1986).

In Ecuador, regional investigations supplied information on the legume marketing structure that was useful in setting the project's research agenda. In one region, farming systems research revealed that increased production and a stable supply of green legumes throughout the agricultural cycle would be a viable, income-generating strategy for smallholders. In contrast, in a second region, researchers found that no purpose would be served by extending legume production across the year because the market was monopolistic, with only a few large landowners and merchants controlling the marketing channels (Barsky 1983; Garrett and Goldstein 1984; Uquillas and Garrett this volume).

The effects of foreign exchange shortages and balance of payment problems on agricultural development were also investigated. In many of the host countries, such shortages limit the importation of fertilizers, chemicals, machinery, vehicles, and fuel. Taken together with land-tenure issues, these shortages also influenced agricultural credit policies. In some contexts, agricultural development banks gave priority to owners of medium or large farms producing crops for export rather than for domestic consumption. This

meant that small-scale producers were unable to acquire needed production inputs or were forced to rely on credit from local money lenders (Due 1986; Ferguson and Flores 1987; Uquillas and Garrett this volume).

The issues addressed in such studies represent significant constraints to agricultural development, often impeding the production and utilization of legumes and other food crops. There is a growing recognition within the Bean/Cowpea CRSP that such problems require attention in their own right if hunger and malnutrition are to be overcome.

Studies of Other Constraint Areas

Baseline studies. Social scientists and agricultural economists have also contributed to the varietal research and technology design work of CRSP technical scientists through the collection of baseline data. In Tanzania, agricultural economists have gathered extensive FSR data on the types of crops produced on small farms; systems of mono and intercropping; the percentage of crop production consumed and sold; family income sources and living expenses; the division of labor by crop and by farming activity; the contribution of beans to family incomes; and consumption patterns and nutritional status (Due, White, and Rocke 1985). This information will permit monitoring of the effects of the new high-yielding bean cultivars being bred and tested by CRSP plant geneticists, pathologists, agronomists, and others. Similarly, in collaboration with nutritionists and food technologists, socioeconomic investigators at the University of Nigeria have conducted surveys of food preferences, infant-feeding practices, and nutritional status in two rural areas. This information will be useful in assessing the impacts of the new cowpea meal processing technology that CRSP technical scientists are developing (McWatters 1985).

Contributions to plant breeding. Socioeconomic research has highlighted the fact that improved varieties of beans and cowpeas must be compatible with local resources, needs, food preferences, and labor utilization and allocation patterns. Investigations in Cameroon (Ferguson and Horn 1984; Ta'Ama 1985), Botswana (DeMooy and DeMooy 1985; Horn and Nkambule-Kanyima 1984), and Malawi (Barnes-McConnell 1986) indicate that stability of yield is more important than quantity of yield to many small-scale farmers. For example, farmers in Malawi and Cameroon usually plant a mixture of varieties of beans or cowpeas. Various landraces within the mixture perform differently in response to environmental stresses. Thus, mixtures may increase the availability of legumes and other plant products (e.g., stovers, straws, leaves, and fodder) while simultaneously reducing the risk of crop failure. Social scientists have therefore emphasized the need for increased technical science research on varietal mixes when new and improved

varieties are created, and on the maintenance of new varieties when these are introduced into mixtures.

In Ecuador, social science members of an FSR team gathered data that directly benefited the legume breeding program. For example, in one case, the efforts of a national agricultural program to develop a pinto bean that would grow well with a newly introduced early-maturing maize variety were discontinued when CRSP researchers discovered that farmers in the region monocropped the new corn variety and followed it with a relay crop of beans or peas.

Social scientists have investigated the relative importance to breeding programs of still other social, cultural, and economic factors—seed color, size and taste preferences, cooking characteristics, nutritional features, and the use of plant residues for fuel or animal fodder. A synopsis of these factors was drawn up and distributed to CRSP plant breeders (Ferguson and Horn 1985).

Crop management and economics. The study of indigenous practices has led to changes in recommended plant-spacing patterns and other crop management practices. For example, farmers in Ecuador were spacing bean plants much farther apart than agronomists recommended. Further research by project social scientists demonstrated that the manual weed control practiced by the farmers required the spacing distances actually being used, a finding that led agronomists to reconsider their recommendations (Garrett 1986c).

Socioeconomic studies in Tanzania (Due 1984) and Malawi (Barnes-McConnell 1986) indicate that new crop varieties and agronomic practices compatible with existing farming systems and cropping calendars stand a much better chance of acceptance and success. These studies also show how, without adequate socioeconomic research beforehand, the introduction of new varieties can have unforeseen consequences. A case from Malawi is illustrative: a new longer-season variety of maize was developed and introduced, but production of the new maize conflicted with labor requirements during the heaviest bean-growing season. Adoption of this new high-yielding maize resulted in delayed bean harvests, increased insect damage to beans in the field, and reduced bean yields (Barnes-McConnell 1986).

Technology development and adaptation. Careful research into farming systems has identified and addressed key production and utilization constraints to technology development and adoption. For example, in Botswana, research conducted under Bean/Cowpea CRSP and other auspices revealed that many farm households were headed by women who lacked access to adequate draft power for field preparation (Horn and Nkambule-Kanyima 1984). This information was used to design a minimum tillage ridger/planter that relies for traction power not on oxen but on donkeys—animals that women can

more easily obtain and handle (DeMooy 1985). In Nigeria, social science investigations have also assisted in the design of new cowpea processing technologies. Research on food preferences and on family labor and consumption patterns has been used in the development of a village-level mill to produce a cowpea meal acceptable for preparing *akkara* and other popular dishes. It is anticipated that this and other new processing and storage technologies will significantly reduce women's work burdens and improve family nutrition (McWatters 1984).

STUDENT TRAINING

The social sciences have had an impact not only on research agendas, but also on student training programs in the Bean/Cowpea CRSP. Between 1980 and 1985, 57 students received MS and PhD degrees under CRSP auspices, and another 86 students were enrolled in graduate degree programs.¹⁰ Approximately 15% of these 143 students were enrolled in social science or agricultural economics disciplines; 35% were in food technology and nutrition; and 50% were in agriculture. Reflecting WID efforts to integrate women into the program, 60 (42%) of the 143 were female.

Students attend a variety of U.S. and host country universities; many come together for the summer workshops annually sponsored by the Bean/Cowpea CRSP. Workshops on biological nitrogen fixation, MSTAT (a computer program for the agricultural sciences), and food-quality concerns have been held, with social science inputs to the last. Beyond these program-wide workshops, some projects sponsor additional workshops with a social science or agricultural economics component. For example, since its inception, the Tanzania project has held yearly regional bean meetings that have brought together students and researchers from a wide range of disciplines—both social and technical—to discuss progress in their fields. Through such interchanges, the valuable lessons learned from the sorts of socioeconomic research described throughout this chapter are shared and reinforced.

CONCLUSION

In long-term research-oriented programs like the CRSPs, although contributions from a social science *of* and social science *in* agricultural R&D are often contrasted (Brush 1986; DeWalt 1985 and this volume), the two do not necessarily exclude each other. In fact, a firm grounding in the social science *of* agricultural issues is imperative to conducting successful social science research *in* agriculture. This is so because the practices of small-scale

farmers undergo continual modification and adaptation in response to factors associated with the household, the community, and the broader political economy. Traditional farming methods persist not by chance, but as the result of an ongoing process of selection (Brush 1985). Thus, static accounts of farming practices, food processing and consumption patterns, and so forth may ultimately be less useful in designing appropriate interventions than is the elucidation of larger processes and directions of change in the agricultural sector. Ideally, therefore, social scientists and agricultural economists on multidisciplinary agricultural R&D programs should bring to these ventures the same kinds of critical perspectives and disciplinarily grounded knowledge and skills as do their counterparts in the biological and technical sciences.

NOTES

1. M. W. Adams of the MSU Department of Crop and Soil Sciences directed the Bean/Cowpea CRSP planning grant with the collaboration of D. Wallace, on sabbatical from the Department of Vegetable Crops at Cornell University.

2. The director is Patricia Barnes-McConnell.

3. The U.S. principal investigator (PI) is Matt Silbernagel, a plant breeder from the USDA and Washington State University; the co-PI is Jean Due, an agricultural economist from the University of Illinois; and the host country PI is James M. Teri.

4. The U.S. PI is M. Wayne Adams, an MSU plant breeder. Between 1980 and 1986, the co-PI was Pat Barnes-McConnell, the CRSP director. As an anthropologist, I took over as co-PI in 1987. From 1980 to 1985, the host country PI was Todo Edje; Wilson Msuku now holds that post.

5. The U.S. PI is Kay McWatters, a food technologist at the University of Georgia. A number of survey researchers from the University of Nigeria have participated in the project. The host country PI is Dickson O. Nnanyelugo.

6. Toward this end, a series of Women in Agriculture Resource Guides has been compiled. The series reviews social science and agricultural economics literature on the small-farm sector and women's roles in agricultural production in the host countries. The guides examine the implications of this literature for project goals and also provide information on women's groups in the host countries.

7. Nancy Axinn was WID specialist with the Bean/Cowpea CRSP from the program's inception through 1983, when I assumed that responsibility.

8. At the same time that researchers have become aware of each other's potential contributions, CRSP funding levels have been reduced. Budget cuts have made it somewhat more difficult to act on these increased understandings through developing more inclusive or innovative research agendas that integrate additional scientists (of any sort) or through initiating a socioeconomic research project in its own right.

9. Jean Due was responsible for the agricultural economics research in Tanzania; Pat Barnes-McConnell directed the Malawi social science research team; Patricia Garrett coordinated the sociology component of the farming

systems project in Ecuador; and Kay McWatters oversaw the survey research in Nigeria. Nancy Horn and I carried out secondary data searches on the small-farm sector and women's roles in agriculture in Botswana, Cameroon, and Guatemala.

10. Eighty-seven of these 143 students were from host countries or other developing countries; the remainder were from the United States.

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