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Report of a Seminar

# Women and Agricultural Technology: Relevance for Research

Volume 2 – Experiences in International  
and National Research

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# **Women and Agricultural Technology: Relevance for Research**

## **Volume 2 - Experiences in International and National Research**

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on Women and Agricultural Technology**

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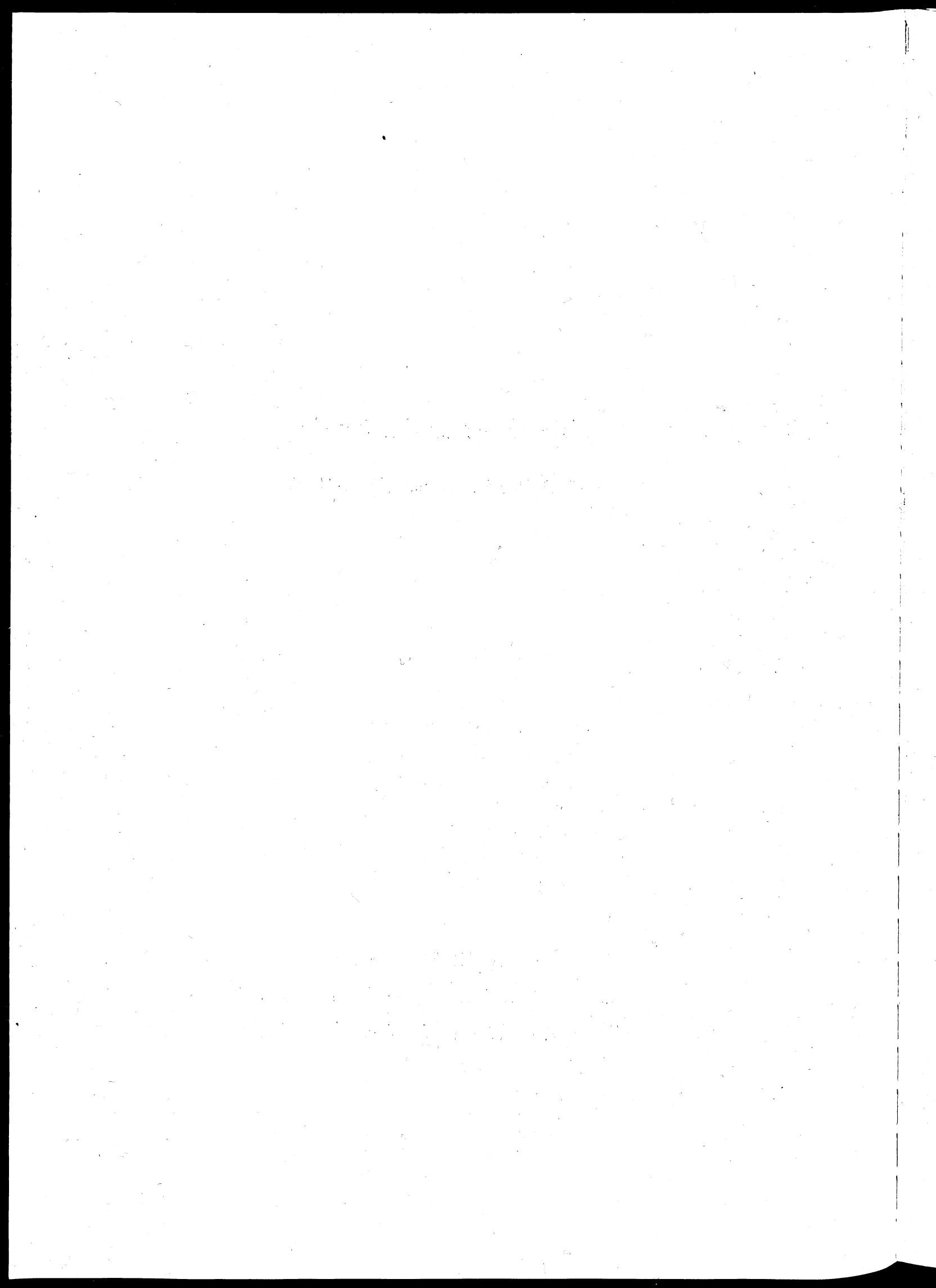
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Women and Agricultural Technology  
in Latin America and the Caribbean

by

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## 1. INTRODUCTION

The existence of widely variant incentive structures faced by farmers in low-income countries which cause different rates of adoption of new technology among them is well recognized. Thus, differentiating small farmers into "special user groups" among the farm population and assessing technology in terms of its appropriateness to their special needs is an integral component of agricultural technology research and development, as testified by the growth of on-farm research or farming systems research programs which address this objective. More problematic, however, is the general issue of how public sector research organizations serving farmers in developing countries can identify and set priorities among different client groups who are often powerless to communicate their needs. Without the intervening mechanism of the market to signal the relative importance of such groups and the particular nature of their needs for agricultural technology, special research must often be undertaken even to identify their existence. Women, as the "invisible farmers" of the Third World, are a case in point. Research documenting their direct participation in agricultural field crop production and in other components of the food system of the rural poor has shown women to be potential users of agricultural technology. Women have also been identified as victims, and sometimes beneficiaries of technical change in agriculture. The thrust of ex post facto studies of technology adoption which examine gender-related issues is to conclude that there are often hidden costs and inefficiencies in agricultural research which fails to take into account the special interests of women as potential clients or user groups. Nonetheless, very few examples exist of agricultural technology development which includes gender as a criterion for ex ante analysis of technology design options.

In Latin America, cultural and socioeconomic definitions of sex roles in agriculture tend to make women particularly invisible and difficult to isolate into sex-specific interest groups for the purposes of agricultural technology design. At the same time women represent a pervasive influence in farming decisions and important beneficiary groups which must be taken into account when evaluating strategies for technical change in agriculture. This paper discusses the relevance and implications of gender-related features of agriculture in Latin America for agricultural research and development within the mandate of the CGIAR system of International Agricultural Research Centers (IARCs). The general objective of the paper is to review what is known about the role of women in agriculture and the food system in Latin America, and to assess the adequacy of this information for defining objectives and strategy in agricultural research programs. First, key issues for agricultural technology research and development are outlined in terms of the effects of sex roles on food production and welfare of the rural poor in low-income countries. These relationships are considered specifically in terms of IARC mandates and objectives. The next two sections of the paper review the evidence on participation rates of women in Latin American agriculture, and what these imply for identifying women as special user groups for agricultural technology. Key research areas are

identified where new information is needed to evaluate the relative importance of such groups in terms of CGIAR system research priorities and strategy.

2. IMPLICATIONS OF GENDER FOR CGIAR OBJECTIVES:  
AN ANALYTICAL FRAMEWORK

The three main objectives of research on technology for developing countries by the CGIAR system can be summarized as follows:

1. to contribute to increasing the amount, quality, and stability of food supplies in low-income countries;
2. to contribute to meeting nutritional requirements of less-advantaged groups in low-income countries;
3. to take into account "the need to improve the level of income and the standard of living of the less advantaged sectors...(specially rural) which determines their access to food, equity in distribution of benefits from research and efficiency in use of agricultural resources" (Technical Advisory Committee (TAC), 1979, cited in Pinero and Moscardi, 1984).

These objectives specify several outcomes which potentially depend on the effect of gender-related variables on agricultural production and the adoption of new technology. It must be stated at the outset that the empirical basis for testing such causal relationships in the Latin American context is extremely weak. Nonetheless, research evidence that gender has similar effects on these outcomes in other regions of the world tends to lend support for such isolated findings as do exist, while the available research on sex roles in Latin American agriculture indicates that these are not so different from non-Latin cultures in some important respects as tends to be popularly assumed.

The argument that gender is a factor in the amount, the quality, and the stability of food production, as well as the access to food and nutritional standards of the poor, is based on causal relationships summarized in Figure 1. Especially in the Latin American context, these causal relationships must be termed hypotheses, drawn from case studies, in view of the extreme paucity of empirical research for Latin America that includes gender as a variable. This section of the paper reviews these relationships with particular reference to the available evidence from Latin America, with two objectives: (1) to provide a general analytical framework for the subsequent discussion of women's participation rates in agriculture in the region, and (2) to highlight the deficiencies in research that must be addressed in order to identify women as special user groups for agricultural technology.

Figure 1 outlines several features of structural change in Latin America which affect rural women's work roles on the farm and off-farm employment opportunities. The allocation of women's time among these different activities has implications for three important functions of the rural household (termed intervening variables in Figure 1): the management of food consumption (food preferences); decision-making roles in agricultural production and household expenditures; and for reproduction



(child care and fertility). Gender affects the way in which these activities are organized within rural households, and these activities in turn influence the adoption of new technology and other related outcomes, shown in Figure 1.

The relevance of gender to agricultural technology adoption and food production in the Latin American context must be assessed in the context of the dual structure of the agricultural sector. Salient features which affect rural women's work roles and time allocation are summarized in Figure 1 under the heading of "structural changes in the rural sector." In brief, two major trends - the declining size and stagnant labor productivity of small farms, in tandem with modernization of the large-scale, capital-intensive estate and plantation sector - are seen as contributing to a process of "proletarianization" of small holders and near-landless minifundias. This process is significant for rural women's work roles in that it entails an increased dependence on off-farm earnings and the migration of surplus labor from the family farm (de Janvry, 1981; Deere and de Janvry, 1981; Garcia, 1980; Leon de Leal, 1980; Ossandon and Covarrubias, 1980; Jaquette, 1983).

Estates (haciendas) and plantations increasingly dispense with permanent laborers in favor of temporary wage laborers who often migrate from harvest to harvest. Some studies suggest that the resultant increase in underemployed male wage laborers has displaced women from what were once female tasks, so that women have been increasingly relegated to the status of unpaid workers on family plots. The evidence is contradictory, probably reflecting local labor market situations in different Latin American countries, and differences in sex-typing of agricultural tasks such as rice planting, coffee harvesting, or cotton picking. For example, when temporary wage labor is paid by piece work, this encourages women and children to join men in the seasonal labor force (Deere and Leon de Leal, 1982; Medrano, 1980; Garcia, 1980; Young, 1978; Sautu, 1979, 1980).

Traditional peasant agriculture in Latin America has been conventionally characterized as a prototype of the "male farming system" in which most of the field labor in agriculture is done by men (Boserup, 1970). However, the major thrust of recent evidence from microstudies is to show that a trend towards the "feminization of farming" exists, and that in general the participation of Latin American women in agricultural production has been substantially underestimated.

The de facto female-headed farm, where men are seasonal migrants or primarily engaged in off-farm labor, is an extreme case of the tendency for women to be more heavily involved in agricultural production activities as farm size decreases, and as the importance of off-farm wages to household income increases (Buvinic and Youssef, 1978; Deere, 1982). The magnitude of this trend for the region and its significance for farm management in the small farm sector is impossible to estimate from available information. However, some important implications are indicated by microstudies of the "feminization of farming", for how rural women allocate their time, and what this in turn implies for farm decision-making and family welfare.

There are few published studies of rural women's time allocation for Latin America which enable one to estimate how much of their time on a daily and annual basis is devoted to specific agricultural tasks, taking into account important regional, cultural, and socioeconomic differences. Although time budget studies are increasingly recognized as important by women's research organizations in Latin America, the reports are not published or available in a form which brings their findings to the attention of a wider scientific research community (Saint, 1984). However, it is widely stated in the ethnographic literature that the agriculturally-related work (food processing and cooking for field hands; gathering fuel and fetching water; cultivation of gardens and subsistence plots; care of small animals; and small-scale marketing activities), which constitutes rural women's traditional work in Latin America, entails onerous, repetitive tasks which occupy most of their waking hours. There is some sparse evidence to suggest that as women's participation in agricultural field tasks as unpaid labor on family farms and as their employment as wage laborers increases, and as cash wages become the major component of household income, then women's time allocated to subsistence food production and food preparation declines. As women's time for domestic food production becomes a scarce commodity, food preparation preferences change in favor of purchased quick-cooking commodities which may be detrimental to nutritional standards, especially of children. For example, women substitute rice and wheat for coarse grains and legumes (Carloni, 1984; Stavrakis and Marshall, 1978). One study in Colombia found that subsistence "garden" plots tended by women were a feature of the better-off strata of small farms, not found among the very poorest farms (Janssen, 1984).

Decreases in women's time allocated to managing subsistence food production and generating small amounts of cash may contribute to changes in patterns in household consumption because there are different male and female preferences for how expenditures are made. Many studies observe that in Latin America farm products reserved for household consumption are traditionally managed exclusively by women (Borque and Warren, 1981; Ember, 1983; Stavrakis and Marshall, 1978; Chayney, 1983; Deere and Leon de Leal, 1982). Women's time allocated to so-called domestic activities can involve a significant managerial input to determining the balance between subsistence and cash crop production on small farms, and the balance of expenditures on food versus other goods. One study notes that women produce almost all food consumed by small farm families where men are engaged in cash cropping in Argentina (Sautu, 1979). Another found that patterns of intercropping were related to how women manage food consumption. The relationship between food supply from a woman's subsistence plot and from fields allocated to the cash crop affected the balance of secondary crops for household consumption intercropped with the main cash crop (Janssen, 1984).

Small-scale marketing, and the feeding and selling of small animals are means of capital generation and savings on small farms. One study notes that women generate on average one third of household cash income from these activities and up to 40% of cash income in well-to-do peasant households (Deere, 1983:120). Observers have noted that this income can be viewed as "women's" income, used by women for incidental expenses of their children such as extra food, clothes, medicines, or school supplies (Schofield, 1979; Young, 1978). There have been no empirical studies

which attempt to trace sources of income and expenditure in relation to gender in the rural household in order to document the relative influence of women's consumer preferences. Some studies of Latin cultural definitions of sex roles emphasize the complementarity of male and female work roles and how this entails mutual interdependence and power-sharing, others point out how men override women's preferences (see Borque and Warren, 1981, for review of this literature). Since both instances occur, it is dangerous to generalize about the influence of women's preferences in farm decision-making.

The "feminization" of farming, as men engage mainly in off-farm labor, implies an increase in women's decision-making over production inputs, including choice of technology. In one example where survey research attempted to measure participation by sex in decisions about farm inputs, the incidence of women's decision-making about farm input use did increase as farm size decreased (Deere and Leon de Leal, 1982). Table 1 reports findings from this study which show that in "near-landless" and "smallholder" farms, women were the principal family members charged with decisions about what to plant, where, and when, in the majority of households. Only in the wealthier strata of farms was women's participation in such decisions restricted. The same pattern occurs among farm strata with respect to inputs. Women were the principal decision-makers about seed and fertilizer inputs in 52% of the poorest farms and 27% of the wealthiest. Over 32% of households allocated the responsibility for inputs primarily to women, and women shared in these decisions in a further 35% of households. Studies of technical change in Latin American agriculture which attempt to trace choice of technique on the small farm to gender-related preferences are nonexistent, and such information of this nature that exists is anecdotal. However, because they have different work responsibilities, rural women in Latin America do face different incentive structures from men, which may influence adoption of agricultural technologies on small farms where women participate in decision-making about input use.

Labor requirements of new technology have different implications for men than for women who do domestic tasks as well as agricultural field labor on the home farm, while men work off the farm. Some studies find that farm women in Latin America do not customarily contact hired labor and have difficulty in doing so or in exchanging labor with men (Deere and Leon de Leal, 1982; Borque and Warren, 1981). In several cases, hired labor appears to substitute for farm women's field labor rather than to complement it (Sautu, 1980). Hence women who do field tasks and also play a significant role in farm management probably face stringent time constraints which may cause male and female acceptance of technical change to differ.

One study in the Caribbean observed a direct decline in agricultural production on female-managed farms as traditional male tasks were neglected: land went out of cultivation, terraces and irrigation systems deteriorated, and production fell back into that level of subsistence manageable with women as a principal source of family labor (Chayne, 1983). Not only time availability, but also the multiple nature of rural women's work roles may cause their preferences for farming techniques to differ from those of men. An example of this is given by Mintz (1964) who shows that a short-season bean variety was preferred by Haitian women

farmers because it provided rapid turnaround on a small amount of capital which they would then invest in marketing other commodities at harvest-time.

The access of a woman, in the absence of a husband, to credit, cash for purchased inputs, and extension assistance tends to depend on her access to male kinfolk to mediate such transactions. For example, some credit systems in Latin American countries require both husband and wife to sign loan documents.

On the other hand, rural women in Latin America are more likely to find urban employment, albeit at very low wage rates, than men, and in certain groups have a higher rate of rural-urban migration than men (Singh, 1980). The effects of different rural and urban labor market opportunities on male and female preferences for farm household resource allocation are not known, but one implication is that female preferences may tend towards the short-run, as opposed to long-run investments in improving farm productivity (de Janvry, 1981; Elmendorf, 1976; Borque and Warren, 1981).

Research for Latin America on the causal relationships outlined in Figure 1 is fragmentary and does not provide any basis for estimating the importance of gender-related effects on food production and welfare outcomes relative to other variables which also are related to technical change in agriculture. In this context it is important to note that technical change in Latin American agriculture has been primarily responsive to private sector investment and to government policy, such as that subsidizing capital costs of mechanization (Pinero et al, 1979; Trigo and Pinero, 1981). Two broad questions have to be addressed in order to begin to identify the relative importance of gender as a determining factor in the adoption of new agricultural technologies. First, what is the sexual division of labor or who does the work in agriculture? Second, are the benefits of different types of technical change in agriculture likely to be distributed differently between the two sexes? The next two sections of this paper examine the evidence for addressing these questions.

### 3. SEX ROLES AND THE PARTICIPATION OF WOMEN IN LATIN AMERICAN AGRICULTURE

Sex roles in Latin American agriculture must be interpreted in terms of cultural ideals about appropriate behavior (popularly described as "machismo") and objective performance of role obligations, which are not necessarily congruent. Cultural ideals cause male and female self-perceptions of the work they do in agriculture to designate men's work as field work and women's work as "house work". However, detailed studies of the tasks women and men actually take part in shows that the division of labor (either domestic or agricultural) is not necessarily demarcated into exclusive sex-specific tasks. This flexibility in the performance of sex roles in Latin American peasant agriculture is related to cultural factors (the strength of Hispanic versus Indian traditions); social class (whether income comes primarily from land or wages); and the degree of market integration of the peasant economy. There is, therefore, great heterogeneity in the work roles performed by women in agriculture. This section of the paper discusses the evidence on women's

participation in the agricultural labor force in Latin America with the objective of illustrating some of this diversity and its implications for agricultural technology research and development.

The aggregate picture of women's participation rates in the agricultural labor force in Latin America, given by census estimates, supports the use of the term "male farming system", interpreted as agriculture in which men do most of the work. As the figures summarized by region in Table 2 show, women appear to form a small proportion of the total agricultural labor force in Latin America although there are substantial regional variations. Only a small proportion of women defined as economically active are employed in agriculture. However, these estimates must be interpreted with extreme caution. Numerous microstudies find much higher participation rates for women when they take into account several conceptual problems in counting agricultural work done by women which result in underreporting. Such problems include cultural perceptions of what work women do, which cause women as well as men to report a woman's primary occupation as "housewife" even though more detailed interviewing discloses other agricultural employment. For example, one study in Cajamarca, Peru, found 49% of households reported female employment in agriculture, but detailed interviewing showed women engaged in farm work in 86% of households (Deere, 1978). Other factors which cause underenumeration in Latin America of women's agricultural labor force participation are census definitions of what constitutes economic activity by unpaid female workers, minimum hours of work required by census definitions, time reference periods of census interviews, and the seasonality of female work. Some authors argue that changes in census classifications may account for the apparent drop in the number of women enumerated as economically active in agriculture in the region since the 1950s (Lopez and Leon de Leal, 1977; Deere, 1978; see also Dixon, 1982). FAO's 1970 agricultural census counted numbers of persons engaged in agricultural activities on a holding, regardless of the time involved or whether paid or unpaid. The results showed higher female shares of the agricultural labor force than found by International Labor Office (ILO) and census estimates in 32 countries. For Central and South America, the FAO-estimated proportion of females in the agricultural labor force is 19% and for the Caribbean, 54%. For the region, rates were on average three times higher than those for Latin America reported elsewhere (Dixon, 1982:550-5). Studies by FAO in Colombia, Chile, Honduras, Paraguay and Peru indicated that, depending on the dominant crop in the country, between 35% and 65% of women work throughout the year on agricultural tasks (Jimenez de Barros, 1983).

Microstudies of women's participation in smallholder agriculture in Latin America consistently report involvement of women in planting, fertilization, weeding, irrigation, harvesting, threshing, fodder collection, and animal care (see for example Borque and Warren, 1981; a review of microstudies from the Andean countries in Deere and Leon de Leal, 1982; case studies in Colombia in Leon de Leal, 1980; Rubbo, 1975; Alberti, nd.). In most cases, the data are not analyzed in such a way as to enable one to identify a clear-cut sexual division of labor, except with respect to land preparation with the plough (or tractor), which appears to be almost exclusively a male activity. To illustrate this diversity of findings, Table 3 reports data from one of the few studies which quantifies and disaggregates participation rates by agricultural

field task. The percentage of women who participate in any given task, such as planting in Table 2, varies substantially from one community to another.

One of the major shortcomings of microstudies of the sexual division of labor in Latin American agriculture, from the point of view of agricultural research, is their neglect of crop-specific variations in the tasks done by men and women. If participation rates in agriculture were disaggregated by sex, field operation, and crop, it might then be possible to interpret some of the diversity of findings. Moreover, several studies show that important differences in participation rates occur by farm size strata, so that this variable must also be controlled for when interpreting participation rates by sex. For example, Table 4 compares the percentage of total labor days by field operation contributed by women from two farm size strata in two different crops, maize and tobacco. These data come from another study of one of the Colombian communities, El Espinal, for which aggregate female participation rates were shown in Table 3. It can be seen that aggregate participation rates shown in Table 3 do not reflect consistently the picture shown in Table 4 for different crops. There are substantial differences in the proportion of labor days contributed by women to maize cultivation in the two farm size strata. Women do a higher proportion of the work, and most women's labor in maize is family labor on small farms, while women are hired for maize operations by medium-sized farms. In tobacco cultivation, the pattern is quite different. Women still do more work in tobacco on small farms, but most of the female labor is hired and women participate in all field operations. In contrast, all female labor for tobacco is family labor on medium farms and female input is specific to certain field tasks. These data illustrate the heterogeneity of women's involvement in agriculture in Latin America, and the difficulty of extrapolating from the available data to derive implications for the design of commodity-specific agricultural technology.

Another consideration is that the sexual division of labor in Latin American smallholder farming systems appears to be such that men and women participate in the same field operation - such as planting potatoes - but planting techniques are broken down into components, which may be sex-specific. For example, men make the holes or furrows and women place the seed. Borque and Warren (1981:123) argue that there are key tasks within broad categories of work which are reserved to men and thus function as a mechanism for excluding women from access to critical resources:

"Women participate in a broad range of agricultural activities, sometimes side by side with men, on other occasions in a fashion that complements men's work. Yet women's status appears to be more clearly shaped by those tasks from which they are excluded. Women plant, irrigate, and harvest; they do not break up hard earth with pointed metal rods, plow fields, open irrigation channels, or tie sacks of the harvest on burros. Because women are excluded from tasks such as soil aeration and plowing, they cannot directly open up new private landholdings or extend communal fields. Nor can they begin the agricultural cycle on old fields without assistance. Because women cannot load the harvest on pack animals, they are

dependent on men as a link in the chain of events which establishes the value of crops women produce alongside of men." (Borque and Warren, 1981:122).

A similar observation is made in another study which shows that the use of tools or implements draws cultural boundaries on the tasks in which women engage, and that this extends to the use of tractors, or sprayers for fumigation (Deere and Leal de Leon, 1982:61). Women tend to participate in all agricultural tasks in primarily subsistence crops, but only in nonmechanized tasks in industrialized crops such as irrigated rice, cotton, coffee, sugarcane (Gonzalez, 1980).

To this point, the focus of this discussion has been the question, "Who does the work in agriculture?" The available evidence is that in Latin America women cannot be ruled out a priori as participants in any of the agricultural field tasks entailed in smallholder production. The extent to which women participate and the sex specificity of tasks depends on several variables:

1. the role of a given crop in the household subsistence and cash economy;
2. farm and nonfarm employment opportunities for either sex;
3. the availability of male labor (family or hired) to substitute for the labor of farm women;
4. cultural perceptions of what are key tasks reserved exclusively to men.

In summary, two major characteristics of the sexual division of labor in Latin American agriculture stand out. Industrialized crop production in the large farm sector involves a division of labor which is quite sex-specific. Women are hired as wage laborers for tasks such as coffee harvesting and cotton picking that have not been mechanized, or they work alongside men as members of migrant labor families doing piecework. Regional differences in the tasks men and women perform depend on the local supply of male and female wage labor, and the substitutability of male and female labor in the large farm sector. In smallholder agricultural systems, the division of labor is structured around interdependent sharing of tasks by the sexes when men work on the farm alongside the women. The sex-specificity of tasks appears to be diverse, and flexible or responsive to changing labor market relations. When men work off-farm, women have higher rates of participation in tasks that are male-dominated on farms that hire in labor. The interdependence of the sexual division of labor on small farms suggests that identifying women as special users of agricultural technology, in terms of "who does the work in agriculture", is extremely exacting in requirements for detailed data on the sexual division of labor on a case by case basis. For the purposes of technology research and development, it is also critical to characterize women as special groups in relation to who will benefit from technical change. The next section of the paper addresses this issue and outlines a typology of rural women in Latin America.

#### 4. A TYPOLOGY OF RURAL WOMEN IN LATIN AMERICA

This section of the paper outlines a framework for distinguishing distinct groups of rural women in Latin America who can be viewed as potential users of technology or beneficiaries from technical change in agriculture. To provide a context for the issue of who benefits from technical change, it is important to recognize that most women in Latin America are urban residents (Table 5) and that rural women therefore represent a minority of potential beneficiaries in the region. The 53 million rural women in Latin America can be divided into broad categories which combine gender-specific and class-related situations. Census estimates must be interpreted with caution as discussed earlier; however, the figures in Table 6 indicate something of the magnitude of different categories of economic activity. Unpaid family workers represent proportionately the largest group of women workers in agriculture. The second largest group is "self-employed" women, which in some countries such as Bolivia reflects the importance of traditional artisanal and marketing activities carried out by women. Women wage laborers, the third largest group, amount to approximately 22% of women employed in agriculture according to census definitions.

These figures provide a rough indication of the relative size of different groups, but not a sufficiently accurate one to provide guidelines in setting research priorities. This is particularly important because a more detailed characterization of different groups of women shows that these may have competing interests. Difficult trade-offs may be involved in designing research strategy which takes their needs into account.

A typology of rural women must take into account three major variables which define their status: access to and control over land, time allocation, and marital status. Figure 2 summarizes the major social class divisions, types of farm enterprise, and related labor relations which provide a framework for dividing rural women into distinct groups. In Figure 2, women in the landed elite and middle class are assumed to be mostly absentee, part-time residents on farms, or wives of farm managers. The following discussion is concerned only with women who are farm residents in the small farm sector or laborers.

##### Farm "Housewives"

Women in this group are members of relatively prosperous families with smallholdings, which engage in commercial crop productions, and are large enough farms to employ family labor year-round as well as to hire in seasonal wage labor. Farm wives and daughters in this social group appear to spend most of their time on so-called domestic work, which includes postharvest processing, seed selection and storage, as well as tending food gardens and caring for livestock. They tend to do very little fieldwork. These women typically have an important managerial role in farm decisions, although they may not visibly participate in farm work. While they may have little direct input into choice of technology, they are influential in deciding how resources are allocated among different enterprises of the household. One observes, for example, that education of children is an important priority for women and that women in prosperous families may want the family to migrate from isolated rural



settlements to small towns where medical and educational facilities are better. Such preferences affect the objectives of the small farm organization, and indirectly influence decisions such as technical choice. This group of women is significantly underenumerated by census estimates of unpaid family workers.

#### Farm Domestic and Field Workers

These women are members of "subfamily" farms which do not generate enough income to support the family. Although the men work off-farm some of the time, the farm is still managed as a joint enterprise by husband and wife. Subfamily farms produce a mix of cash and subsistence crops, and women participate as unpaid family workers in field operations, in addition to their usual domestic work. These women are most likely to have multiple work roles as subsistence food producers, laborers in cash crops, artisans involved in handicraft production, and petty traders. Young women from subfamily farms are likely to migrate to cities, leaving older women to run the farm, and they may send remittances to the family in the countryside. Women on these farms may be entrepreneurs, investing small amounts of capital in "new" crops such as vegetables, in small livestock, or in marketing. It is among this group that women's time allocation considerations and expenditure preferences are likely to enter directly into decisions about agricultural technology on the small farm.

#### Women on "Minifundias"

These women belong to the "near-landless" class of cultivators in Latin America for which wage labor is the principal source of income and land may be primarily a means of subsistence food production, although a small amount of produce is marketed. In this situation, women who are members of a stable marital union take charge of the farming and marketing of farm output while men are almost wholly employed off-farm. Agricultural production may be managed by these women as an extension of the woman's role in the food system with its principal objective to provide a year-round supplement to the family diet for which staples are purchased. However, these women are also likely to engage in wage labor, as domestic help on wealthier farms, as migrant labor in the planting or harvesting of certain crops, in handicrafts, in petty trading, and in seasonal work in agro-industries. As a result the subsistence food garden may be abandoned. Technical changes in agriculture are likely to be most significant for this group of women in terms of employment effects and their effect on the price of staple foods relative to wages.

#### Women Wage Laborers - the Female "Underclass"

This group of rural women is distinguished from the women from minifundias discussed above by their lack of stable access to land and absence of a stable marital union. Consensual unions without legal ties between men and women are an accepted social institution in traditional Indian cultures in Latin America, viewed as a type of trial relationship (Gutierrez, 1975). However, the traditional viability of this institution depended on a network of kinfolk which either ensured that marriage took place once children were conceived, or undertook their economic support. Among the poorer rural social strata, such support mechanisms no longer function, creating an "underclass" of poor women who

are in a more precarious economic position than women in stable marital unions or even male wage laborers. Members of the female underclass are impoverished widows, single mothers who have no access to land, or illegitimate female children with no land rights (Borque and Warren, 1981). The absence of a male partner may effectively block a single woman from access to land because of inheritance customs or land reform legislation, which in some countries denies single and married women the right to their own parcels and assigns these to the head of the household, or requires male authorization for a woman to administer property (FAO, 1979). Many such women are urban residents who go out into the countryside to find work (Garcia, 1980).

Survival strategies for landless rural women include migration to cities, prostitution, domestic service, agricultural fieldwork, or pairing up with a man who can provide her with access to land. Biographical studies of such women suggest that investment in their children is the most compelling concern that motivates their decision-making as members of an unstable agricultural producing unit (Borque and Warren, 1981; de la Rive Box, 1984). The implications of different female and male incentive structures for farm management decision-making in households based on unstable consensual unions has not been studied in Latin America outside the Caribbean. However, many authors suggest that this type of situation is an underlying factor in the "feminization of farming", when women are abandoned by men with a small parcel of land - to which the women have no legal rights - for their support and that of the children.

In summary, rural women in Latin America can be differentiated into several distinct interest groups. Those directly involved in smallholder agriculture who are potential clients or "users" of technology developed by public sector and IARC research are:

1. farm housewives, who will evaluate benefits of agricultural technology in terms of its effect on their overall household expenditure patterns and desired life-style. These women will have an input into adoption decisions because of their influence on farm management objectives;
2. farm domestic and field workers, who will evaluate agricultural technology in terms of its direct effect on their time allocation as well as its implications for farm income and expenditure. These women may be influential in rejecting technology that requires additional work on the small farm unless it generates sufficient income to enable male family labor or hired labor to meet the need for more labor time. These women are also clients for low-input technology that can be integrated into the subsistence food garden without increasing labor inputs significantly;
3. women on minifundias may also be clients for low-input technology compatible with the minifundia subsistence food garden, but they may benefit more from technical change in agriculture that increases the supply of food staples that they purchase, or that they would purchase if prices fell. This group, like landless laboring women, are most likely to be directly affected by the implications of technology for labor requirements in the small farm sector, which may increase or decrease their employment opportunities.

These interests of different groups of women in terms of agricultural technology development are not therefore necessarily congruent, in some instances they may directly conflict. Determining just what these interests are and the relative importance of the different groups of women they represent are critical issues that must be addressed in order to determine the relevance of gender as a criterion for technology research and development.

5. NEEDED RESEARCH TO ASSESS THE RELEVANCE OF GENDER-RELATED ISSUES FOR CGIAR OBJECTIVES AND RESEARCH STRATEGY

An overview of the evidence on women's participation in Latin American agriculture suggests the following conclusions.

1. The macrostatistical picture showing low rates of women's participation in agriculture is fundamentally misleading because of conceptual problems of measurement of women's work in agriculture.
2. Microstudies indicate higher rates of participation, although quantitative estimates are few and are an inadequate basis for generalization about trends and participation rates.
3. Rural women's work roles in Latin America involve extremely heterogeneous activities.
4. The sexual division of labor appears to be more rigid in estate and plantation agriculture, where women's roles are principally those of wage laborers in specific tasks, often on a piecework basis.
5. In smallholder agriculture the sexual division of labor appears very fluid: women are excluded from some tasks more than others, but examples exist where they take part in almost all agricultural field operations; women's participation may be in sex-specific tasks that are interdependent with tasks performed by men.
6. Women's participation in field tasks varies by the social class, techniques of production in a crop, and the crop's role in the economy. Microstudies almost universally neglect to disaggregate participation rates by crop. Participation rates of women in smallholder agriculture appear to be highly responsive to labor market conditions, in particular the availability of male wage labor as a substitute for labor of farm housewives in field tasks.
7. Women may contribute to a significant proportion of capital generation in farm households and may influence expenditures and investments as a result.
8. Women play a significant managerial role in smallholder agriculture under certain conditions:
  - a. where subsistence food production managed by women is an important component of total farm production;
  - b. where male labor is engaged in off-farm employment and women take primary responsibility for farming decisions or participate jointly in them because their time is a critical input.

9. Three distinct groups of women can be identified as potential clients or user groups for technology development and research in Latin America, but their interests diverge and may conflict.
10. Certain groups of women (see Figure 2) face different incentive structures from men which may influence acceptance and impact of technical change because:
  - a. male and female work responsibilities and time availability differ;
  - b. male and female control over resources such as land, labor, and cash differ and their preferences and benefits may differ with respect to new relations among these factors of production due to technical change;
  - c. access to institutional resources such as technical assistance and credit are different among men and women.

Although a review of the available evidence suggests that technology adoption, food production and welfare of the rural poor in Latin America are influenced by the participation of women in agriculture, the data base is so weak that the relative importance of gender for agricultural research priorities of the CGIAR system in Latin America must be treated as an empirical question. Furthermore, adequate information on the sexual division of labor on a commodity specific basis is not available to undertake *ex ante* analysis of the implications of gender differences for technology design. In order to accomplish these tasks two different types of research needs must be addressed.

First, a broad assessment is needed of the participation of women in agricultural field tasks and in farm management decisions for specific commodities in regions of major importance within the Latin American IARC mandates. This study must also provide estimates of the size and relative importance of different groups of potential users or beneficiaries from new technology, including men, women and children, on a regional and commodity-specific basis. An informed judgement about the relative importance of different classes of women as special user groups for IARC-generated technology in Latin America can only be made on the basis of such a study. Moreover, this research will provide the foundation for determining the relevance of integrating women's needs into technology design for specific IARC mandate commodities.

The second type of research must address the issue posed at the beginning of this paper, of how public sector research organizations such as the CGIAR system, can inform themselves of the special needs of clients designated as significant target groups. In terms of research strategy within the CGIAR system, the issue is essentially one of developing research models and methodologies which integrate the assessment of women's needs into the design of technologies within the IARCs and which strengthen the capacity of national programs to adapt and deliver such technologies to special user groups, such as women.

In Latin America, several international research organizations (CIAT, CIMMYT, CIP, IFDC) and several national programs (Instituto de Ciencia y

Tecnología Agrícolas (ICTA), Guatemala; Instituto Colombiano Agropecuario (ICA), Colombia; Programas Nacional de Investigación Agropecuaria (PNIA), Honduras, for example) have at different times developed research approaches which address this issue with reference to the small farm client group (Byerlee, D., M. Collinson et al., 1980; Hildebrand, 1981; Rhoades and Booth, 1982; Ashby, 1984). Several steps need to be taken to integrate the assessment of sex-specific needs into such already institutionalized research programs. These include, for example:

- . network-building by the IARCs with experts in women's studies in the region to ensure that the often "fugitive" research on rural women informs agricultural researchers;
- . inclusion of women trainee staff into on-farm research programs to establish access to rural women, often "invisible" to male researchers because of cultural barriers to communication between the sexes;
- . disaggregation by sex of primary data collection on farm labor, both family and hired, routinely undertaken for on-farm research purposes;
- . earmarking resources for basic research on time allocation and resource flows among household members in different types of rural household (see Figure 2). Such studies are required to evaluate empirically the implications of different sex-related incentive structures for the adoption of technology, for food production, and for other CG system research objectives related to the welfare of the rural poor.

Table 1. Women's Participation Over Decision-making

Principal family member charged with activity, percentage of all households by land-size strata, Cajamarca, Peru

Activity	Mother or Mother and Children	Mother and Father or All Family Members	Father or Father and Children	Total
	------(%)-----			
<u>Decides What is to be Planted, Where, and When</u>				
Near-landless households	23	46	31	100
Smallholder households	18	43	39	100
Middle and rich peasant households	<u>4</u>	<u>17</u>	<u>79</u>	<u>100</u>
TOTAL (N = 104)	15	38	47	100
<u>All Inputs</u>				
Near-landless households	52	20	28	100
Smallholder households	31	20	28	100
Middle and rich peasant households	<u>27</u>	<u>26</u>	<u>47</u>	<u>100</u>
TOTAL (N = 230)	32	35	33	100

Source: Deere and Leon de Leal (1982), Appendix.

Table 2. Census Estimates of Women's Participation Rates in Agriculture for Major Latin American Countries and Regions

Region or Country	Women as Percentage of Total Agricultural Labor Force	Number of Women Employed in Agriculture	Percentage of all Employed Women Active in Agriculture
Brazil	9.6	1,257,659	20.3
Mexico	5.2	266,654	10.8
Tropical South America	6.0	342,125	8.9
Central America	2.6	69,264	7.3
Caribbean <sup>a</sup>	32.4	640,291	45.1
Temperate South America	5.6	105,410	3.6

<sup>a</sup>Excludes Cuba

Source: ILO Yearbook of Labor Statistics (1977)

Table 3. Percentage of Women Participation in Agricultural Field Tasks in Three Smallholding Communities, Latin America

Field Operation	Community Case Study		
	García Rovira, Colombia	El Espinal, Colombia	Cajamarca, Peru
	------(%)-----		
Field preparation	10	14	24
Seedling preparation	29	21	NA
Planting	30	16	48
Transplanting	7	32	NA
Weeding	4	31	47
Cultivating	4	20	24
Harvesting	46	52	62
Threshing	NA	NA	66
Processing	51	36	NA

Source: Adapted from Deere and Leon de Leal (1982), Table 7.

Table 4. Participation of Women From Two Farm Size Strata in Field Tasks in Maize and Tobacco Cultivation

Crop	Farm Size <sup>^</sup>	Women's Labor as Percentage of Each Operation					Percentage of Female Labor	
		Land Preparation	Planting	Cultivation	Harvesting	All Tasks	Hired	Family
Maize	Small	12	23	20	23	21	12	88
	Medium	0	8	7	6	6	100	0
Tobacco	Small	33	50	30	49	38	79	21
	Medium	0	0	34	15	21	0	100

<sup>^</sup>Small farms: 0.31-1.00 ha; medium: 3.01-10.00 ha.  
 Source: Adapted from Motta de Correa (1980), Table 8.



Table 5. Urban-Rural Distribution of Female Population in Latin America by Region

Region and Country	Percentage of Femal Population		Total Number Rural Women
	Urban	Rural	
Brazil	69	31	18,508,758
Mexico	66	34	11,285,516
Tropical South America	63	37	12,673,582
Central America	43	57	6,267,103
Caribbean	56	44	3,294,812
Temperate South America	84	16	1,151,862
Total Latin America	65	35	53,181,633

Source: United Nations, Demographic Yearbook (1982), Table 6.

Table 6. Distribution of Women Economically Active in Agriculture by Occupational Category in Latin America

Region and Country	Percentage of Women in Agriculture		
	Semi-Employed	Employers and Laborers	Family Workers
Brazil	35.7	17.1	47.2
Mexico	35.4	44.0	20.1
Tropical South America	53.7	18.9	23.8
Central America	14.1	64.0	19.1
Caribbean	18.0	11.4	64.5
Temperate South America	30.2	43.0	24.9
Total Latin America	32.5	20.9	44.5

Source: ILO, Yearbook of Labor Statistics (1977)

Structural Changes in the Rural Sector, Latin America	Rural Women's Work Roles	Interviewing Variables	Outcomes for Rural Poor
Declining size and stagnant productivity on small farms.	Women's domestic work (includes postharvest processing).	Women's food preparation preferences	Adoption of agricultural technology
Mechanization of capitalist agriculture.	Women's subsistence production (crop and small animals).	Women's control over farm output, income, and expenditure.	Household food availability; home produced versus purchased food
"Proletarianization" of peasant class.	Women's marketing activities.	Women's control over farm management (production inputs).	Household savings and expenditure patterns.
Outmigration.	Women's unpaid labor on family farms.	Women's childcare and fertility control practices.	Child nutrition, health, mortality, and education.
Female-headed farms.	Women's employment as agricultural wage laborers.		
	Women's nonagricultural wage labor.		

Figure 1. Schematic Diagram of Causal Relationships Between Gender-Related Factors, Food Production, and Welfare of the Rural Poor.

Social Class	Types of Farm Enterprises	Farm Labor Relations	Types of Women
Traditional landed elite	Haciendas (precapitalist estates)	Employ permanent <u>minifundista</u> labor force	Absentee or wives of farm managers
Capitalist landed elite	Estates and plantations	Employ mainly seasonal wage laborers	Absentee or wives of farm managers
Rural middle class	Capital-intensive farms	Employ permanent and seasonal wage laborers	Absentee or part-time residents or wives of farm managers
Well-to-do smallholders	Small commercial farms	Use exchange labor, wage labor, family labor	Farm "housewives"
Peasants	Mixed commercial-subsistence	Family labor, hire out some labor for wages	Farm domestic and field workers
Rural proletariat	<u>Minifundias</u> (near landless)	Hire out most labor for wages and farm in slack periods	Women <u>minifundistas</u>
	Landless	Hire out all labor	Women wage laborers: "female underclass"

Figure 2. Types of Rural Women in Latin America Related to Social Class and Type of Farm Enterprise.

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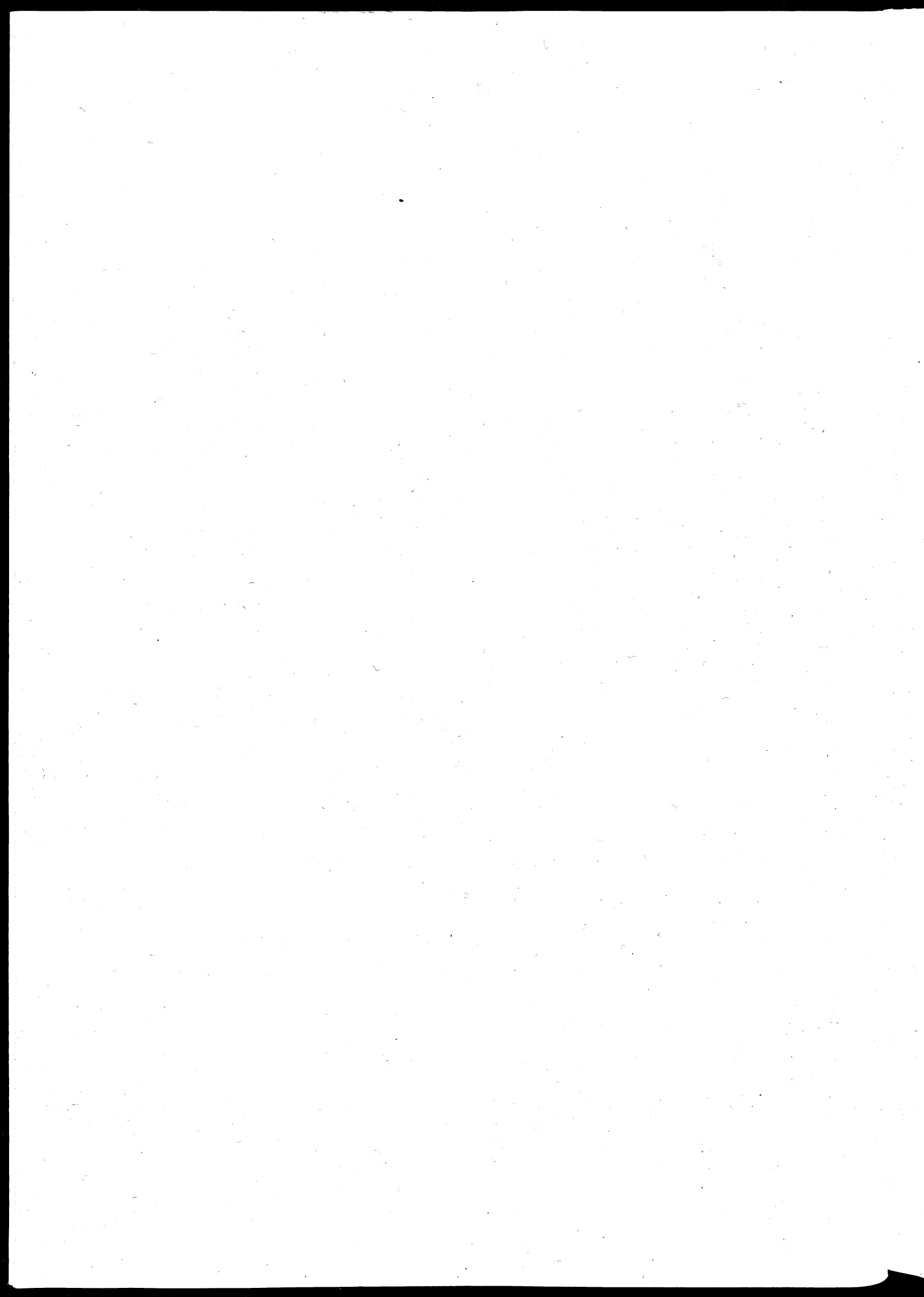
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PART III

GENERAL ANALYSIS

