

# **GENDER RELATIONS IN LOCAL PLANT GENETIC RESOURCE MANAGEMENT AND CONSERVATION**

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**Keywords:** Biodiversity, plant genetic resources, women, gender studies, natural resource management, conservation, homegardens, foraging, wild plants, folk varieties, folk medicine, medicinal plants, ethnobotany, seed supply, post-harvest processes, culinary traditions, intellectual property rights, ethnobotany

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## **Summary**

Gender issues, and rural women, are crucial to the conservation and use of plant genetic resources (PGR) worldwide. Yet they are often neglected in PGR research, policies, programs, and projects. Women are often responsible for ensuring household food security and family health, although their roles vary in different contexts. They often have greater knowledge and a more diversified perspective than men on PGR because they are responsible for producing or procuring a large number of plant resources and for storing and transforming plants to meet household needs. When women select varieties for their fields or gardens, they consider not only agronomic characteristics, but also those related to processing, storage and consumption needs. Even when women aren't involved in production, their criteria enter into men's varietal decision-making. Women are often responsible for seed management including selection, storage and exchange.

Informal seed exchange systems are often female domains and include mechanisms such as gift-giving, kinship obligations, market and barter transactions. Data show that most wild plants are gathered and used by women for many purposes. Plant domestication is related to this since women often manage “wild” plants in their natural surrounding or domesticate them in homegardens where they also test new crop varieties. Women manage the majority of the world’s homegardens, which are the most complex and genetically diverse cultivated systems known.

Some explain the cross-cultural predominance of women in areas such as seed management and homegardening in terms of the relation these have with domestic work, while others give explanations rooted in cultural beliefs about masculinity and femininity. Whatever the explanation, if women are the world’s main managers of plant biodiversity, then questions must be raised about how they are affected by processes that lead to genetic erosion such as the diffusion of modern varieties, market expansion, decreasing land access and changing consumption patterns. Gender relations are also changing, as are women’s incentives and management practices, which in turn affects biodiversity management. The importance of explicitly including gender and women in many debates on biodiversity has far-reaching implications, not the least of which are related to the definition of what should be conserved, and by and for whom.

## **1. General Background**

Today and in the future, the way that we view women in relation to plant biodiversity will greatly influence our ability to halt the erosion of plant genetic resources (PGR) across the globe, particularly of those plants that humans have found to be useful. Against most thinking on the topic, it is clear that women collectively hold the majority of knowledge about the world’s plants. This is simply because, throughout history, their daily work has required more of this knowledge. Today, when it is more important than ever, women’s knowledge and management of plant genetic diversity are underestimated and undervalued, since this knowledge is researched, documented and recognized only haphazardly. Even more importantly, it is possible that women are often overlooked in PGR conservation efforts. If this is so, their motivations, needs and rights as plant managers will not be taken into account, which is likely to lead to less effective and, quite possibly, negative outcomes. The proof of these statements is to be found in a large but fragmented and scattered body of scientific literature arising from fields such as ethnobotany, cultural anthropology, farming systems research, forestry, nutrition, and gender studies. This is in spite of the fact that the majority of the literature that directly deals with people’s local management and knowledge of PGR can still be termed “gender blind”—that is, unaware of the fact that women and men have different physical domains of work, knowledge, practices, interests and needs with respect to plants and their environments.

### **1.1. Gender Relations and Gender Bias**

“Gender” is a term coined in the 1960s to refer to the relations between men and women that affect in a substantial way how each are expected to behave. These relations are

thought by most to be “natural” or pre-determined—that is, derived from biology or religion. However, for at least a few hundred years, anthropologists have been researching differences between the sexes within societies and households (sometimes referred to as “intra-household relations”). Since the 1970s, gender relations and women in particular have been intensively studied. Taken as a whole, this research has demonstrated that gender relations are socially, historically, and spatially specific. They also vary according to age, kinship status, religion, ethnicity, caste, and class situation within given societies. Differences between men and women are related to the fact that women bear children and men do not. Because of this biological difference, men and women experience life differently, and societal expectations about women’s behavior differ from those of men. But these expectations are socially, not biologically, determined and they differ not only from country to country, but even within small villages. Because these social relations are related to biological differences, gender behaviors also display similarities across societies. For example, women in most societies are mainly responsible for childcare, cooking, and domestic tasks although there are also variations in this pattern. But women’s involvement in just about every other realm of human activity such as agriculture, household financial management, or the wage labor force, varies considerably over time and space. Thus, it has aptly been said that gender relations are “homogenous in their heterogeneity.”

The first division of labor that arose in human society is the gender division of labor—that is, the division of roles and responsibilities according to sex. Rights, duties, freedoms, and obligations of every kind are, in most customary and formal legal systems across the world, also related to sex. Men and women have different and unequal rights to land, inheritance, credit, education, physical mobility, and political and religious participation. The combination of these differences in roles, responsibilities, rights, and obligations means that women’s and men’s daily tasks, opportunities, benefits, and life experiences are nearly always different within the same society, village, and family.

Gender research has clearly demonstrated the presence of “gender bias” in social and natural sciences. This means that scientists take men’s behavior and predominance to be “standard” (e.g. men are the “farmers,” “foresters,” “leaders,” “shamans,” etc.) whereas women are given little importance or their behavior is seen to be “deviant” in comparison with the male standard. This bias particularly affects the social sciences and those disciplines that bridge the social and natural sciences. Gender bias affects the questions formulated, the methods used, and the research outcomes. The repercussions go beyond simply creating biased scientific knowledge: they extend into related practices, policies, and interventions that are intended to change the interactions between people, and between people and their environments and can distort the outcomes in ways that are unanticipated and not always desirable.

This article summarizes preliminary conclusions from an extensive, ongoing literature review on women and gender relations in PGR management at the local level (on farms, in gardens, and in villages and surrounding areas). It is known that most plant species used by people are maintained in traditional agroecosystems and natural plant communities, particularly in tropical developing countries, and that the majority of these

plant species and varieties are used for food and medicine. A main conclusion of the literature review is that it is women who are mainly responsible for ensuring that this diversity is available to households. A principle motive for women to use and conserve PGR is to meet household food needs and maintain culinary traditions that are central to cultural identity. It is also often women who must care for their families' daily health needs and supply the household "medicine chest". In traditional agricultural systems, it is often women who process and store harvested crops and, in so doing, they also ensure the supply of seed for future harvests. Women and their children often provide fuelwood and livestock fodder collected from forests and woodlands, and women's production of fibers, utensils, storage containers, and clothing throughout history has depended largely upon plants. Women maintain the supply of diversity through homegardens, wild plant collection, management of plants in borders and field margins, plant breeding and domestication, and selection, maintenance, and exchange of seed. Over much of sub-Saharan Africa and within many tribal communities in South America and the Pacific, women are responsible for the majority of field crop production, particularly for traditional crops ("folk varieties"). Even when women aren't directly responsible for field crop production, they have a major influence on the criteria that men use when they select crop varieties, since men must ensure that these varieties meet women's processing and culinary needs.

However, women's ability to conserve biodiversity and influence the way that others conserve is eroding rapidly. This is happening not only because the forests and other common land resources that women depend upon are dwindling, but also because of the introduction of cash crops and modern varieties that displace their traditional crops; because of the outmigration of males from rural areas that leaves women to manage agriculture without access to labor and other critical resources; due to the erosion of women's rights to private land; and due to the disparagement of their native diets, production, and knowledge on the part of national authorities and scientific researchers. In the not-too-distant future, perhaps, genetic erosion will also be attributable to the failure to recognize women's rights to and knowledge of PGR within new systems that patent or otherwise privatize or compensate knowledge and genetic materials development.

## **1.2. What is Conserved is Related to Who Conserves**

The rapid and large-scale loss of the world's plant and animal genetic resources through modern agricultural production and the destruction of habitat has, since the 1970's, become a major global environmental issue (see also chapter *Environmental Biotechnology*) The UN Convention on Biological Diversity was signed by over 150 governments at the Earth Summit in 1992, followed by the Leipzig Declaration on and the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture, signed in 1996. The Convention on Biological Diversity includes three broad objectives:

- Conservation of biological diversity
- Sustainable use of its components

- Fair and equitable sharing of benefits arising from its use

The goal of conserving the world's biodiversity is based on the recognition that species loss represents a net reduction in the world's genetic variation which both deprives current and future human generations of access to biological resources and endangers the adaptive capacity of remaining species. The other two objectives recognize that the conservation of the world's biodiversity will be achieved only through changes in social and economic processes that return something of the value of biodiversity to those involved. This means that the preservation of biological diversity must be instrumental to achieving human welfare.

For many signatories of the Convention on Biodiversity and the Leipzig Declaration, the hopes are that the privatization of genetic materials and their economic valuation as potential future resources will provide the incentives for national governments and the private sector to preserve biodiversity. Current debates around Intellectual Property Rights and plant breeders' patents (see also chapter *Inventions, Patents and Morality*), about the role and rights of national governments and indigenous communities, about *in situ* versus *ex situ* conservation, and about the need to protect nature from people or to empower people to protect nature, can be seen to have a common denominator, which is the concern about the distribution of costs and benefits of biodiversity conservation (see also chapter *The Economics of Agrobiotechnology*) Underlying these debates is a fundamental disagreement about the ability of the scientific community, governments, and markets to adequately value and preserve biodiversity, since many argue that it is in these institutions where the social processes giving way to biodiversity loss originate (see also chapter *Why Genetic Modification Arouses Concerns: Social, Cultural and Political Impacts*)

An emerging approach to biodiversity conservation that is ever more broadly expounded holds that the major custodians of the world's biodiversity are the people who depend directly upon it for subsistence. These "indigenous people" and "traditional farmers" have seen their livelihood systems disrupted and their cultural and biological diversity dramatically reduced by economic and cultural processes accompanying the expansion of markets and the imposition of exogenous cultural and economic value systems (see also chapter *Biotechnology and Agrobiodiversity*). The implications of such a perspective are that, in order to preserve biological diversity, the benefits of such conservation should accrue principally to those who sustain it, and that the focus of conservation efforts should be on the maintenance of the cultural and agro-ecological systems of small, "resource poor" and biologically rich farmers and rural forest dwellers, which is necessary not only to preserve existing biodiversity, but as well to ensure its continual evolution *in situ* (see also chapter *Farmers and Plant Genetic Resources*). In this perspective, local indigenous property rights, local biodiversity knowledge and management systems, and the direct participation of farmers and rural dwellers in the development and management of conservation efforts, are *sine qua non* for achieving biodiversity conservation.

What has been most conspicuously absent until recently in the debates around biodiver-

sity that, by contrast, has been given prominence in the World Food Summit and in the Earth Summit, is the significance of women and gender relations for biodiversity conservation. The only specific reference to women in the Convention on Biological Diversity appears in the Preamble, which recognizes the crucial role that women play in the conservation and sustainable use of biological diversity and affirms the need for the full participation of women at all levels of policy-making and implementation related to biological diversity conservation. This omission is beginning to be recognized and tentatively corrected. The Leipzig Plan of Action has been amended to include additional reference to gender, and the International Board for Plant Genetic Resources (IPGRI) and the Food and Agriculture Organization of the United Nations (FAO), together with the Commission on Genetic Resources for Food and Agriculture, have drafted a Plan of Action on gender and biodiversity. The principle questions arising that are tentatively addressed in this article are: why are women and gender relations essential to biodiversity conservation; why is biodiversity conservation essential to women's welfare; and why have these relations been so belatedly and only tentatively recognized? In part 2, this article highlights the roles, practices and knowledge of women in local PGR management, as much as possible across different world regions and in different types of plant management systems. In part 3, the significance of gender relations for the management and conservation of PGR are analyzed. Part 4 briefly summarizes current and future needs, particularly for research

## **2. Patterns in Relief: Women's Knowledge and Management of Plant Genetic Resources**

### **2.1. Woman, the Housewife**

Women, in their roles as housewives performing domestic tasks, sustain an intimate and important relationship with plants. "Domestic" refers to unpaid, home-based activities that ensure people's maintenance and functioning within households, thereby contributing to the reproduction both of generations and of entire societies. These tasks include, among many others, food preparation, preservation, storage, and processing, and they are most often assigned to women and girls. While comparative statistics on plant use are not available, many case studies from across the world indicate that the majority of plant varieties used by humans are cultivated or gathered due principally to their domestic (medicinal, culinary and nutritional) values. As is shown below, the kitchen is quite possibly the most under-valued site of PGR conservation.

Culinary traditions are a highly important aspect of cultural identity. Foods are consumed not only for their nutritional content, but also for their emotional, ritualistic, spiritual, and medicinal values. Food is, in most cultures, also a fundamental constituent of exchange and hospitality, which are in turn basic organizing principles of many traditional societies. While the idea of what constitutes an adequate meal or dish may be influenced by men, women are generally considered as the "gatekeepers" of food flows in and out of the domestic sphere. Culinary traditions are perpetuated by the careful transmission of knowledge and skills, particularly from mother to daughter. Culinary traditions and preferences, as well as the post-harvest processes that are required in order to provide

edible and culturally acceptable food, have a marked influence on knowledge, selection, use, and conservation of PGR. For example, in the Andes, the cradle of the world's potato diversity, Zimmerer's research shows that specific cultivars are produced to meet precise culinary requirements. In potato production, different species groups correspond to different uses: freeze-drying, soup-making, and boiling, whereas in maize, different food dishes depend on groups of cultivars. Culinary distinctions form the basis for separate fields planted in different ecological niches.

The significance of culinary traditions and women's domestic work for the preservation of traditional varieties is illustrated by the homegardens of households that migrated from a subsistence agricultural economy in the Yucatan Peninsula to a wage-labor, cash economy in Quintana Roo, Mexico. Greenberg's in-depth research revealed that immigrant home lots are sites of *in situ* conservation not only of traditional crops, but also of elements of traditional Yucatec cuisine which helps to preserve the cultural identity of immigrants in their new environment. Some 140 plant species were found in 33 gardens, most of which were for culinary use. In the traditional gender division of labor in the Yucatan, men's work is primarily in the field and the forest, and women's domain has historically been the homegarden and the kitchen. As immigrants, women create and maintain homegardens even when the household economy is based principally on cash and women engage in wage labor.

There are three major benefits for immigrants who adhere to traditional practices after migrating: (1) traditional gardening and cooking make the transition less stressful; (2) some measure of control can be exerted over the new cultural elements that immigrants adopt; and (3) these practices made important contributions to the household economy in the form of food and in-come. In the Yucatan itself, crop biodiversity is eroding as traditional agriculture declines, which is threatening both plant genetic material and cultural continuity of the Yucatec Maya. Immigrant gardens are conservation sites for traditional crop species and varieties outside of the region and provide the only source of traditional foods in the new settlement area.

Frequently, the plants that women produce, procure, and use for culinary purposes are not even recognized by outsiders as useful food plants. Across much of the African continent, culinary traditions include the use of sauces, relishes, and soups that make the bland carbohydrate staples consumed in the region more palatable and nutritious. These preparations involve a great diversity of plant species, both wild and cultivated, including many "indigenous" vegetables that must be produced or gathered on a very substantial scale. It is usually women's task not only to prepare these accompaniments, but as well to produce or procure the plants that go into them. For example, Akoroda reported that *Telfairia occidentalis* (Cucurbitaceae) is a fluted pumpkin consumed as a "relish" or soup ingredient accompanying yams, cassava, or cocoyam among the Igbos in Nigeria. Used by 30–35 million people, it is a leaf, shoots, and seed vegetable that women are culturally obliged to produce or procure for their households. The nutritional content of these staple accompaniments is essential and often superior to exotic fruit and vegetables, and they are also often less expensive. Local and foreign ethnobotanical literature rarely contains information on this type of food plant since the number of species is large, many are very

localized since they are grown in small patches in homegardens, boundary lands, or between crops, or gathered wild or semi-wild, and they are mainly managed by women. The significance of these “accompaniments” for the preservation of folk varieties is only now being recognized. For example, with respect to multi-purpose species such as cowpea, cocoyams, sweet potatoes, cassava, and pumpkins, selection also occurs on the basis of the leaf as the primary character, for its use in sauces and relishes. Even in Western Europe, substantial knowledge of wild plants is held and passed down from mother to daughter in order to maintain culinary traditions. Particularly in rural areas of France, Italy, Portugal, and Spain, many species of wild plants are collected. Gathering of green plants is often the task of women who use them in complex traditional recipes that form part of local heritage. The survival of this knowledge and use of plants is attributed to the role of traditional cooking and to the role of women in its maintenance.

Which plants are selected, managed, produced, and conserved for food depends on a wide range of criteria related to palatability, culinary qualities, and beliefs about health and nutrition. But domestic work entails more than cooking: it also entails processing, preserving, and storing plants, and plant varietal selection criteria are related to processing characteristics, storability, preservation methods, the technology available for these, and on local knowledge, labor, and fuel availability. Food processing and cooking are even more essential in most traditional societies because they make plants edible through detoxification. These activities are inter-related in terms of labor and time (often representing a series of steps carried out sequentially), in terms of techniques (the way plants are processed influences the way they can be stored and consumed). They are also conditioned by other factors such as humidity and incidence of pests and diseases. These tasks are often indivisible: the same person selects, separates, processes, and stores plant products simultaneously for the next crop, for home consumption, and for sale.

The knowledge and skills required to develop, maintain, and innovate in this post-harvest food chain are complex, dynamic, and vital. The integrity of these processes is essential to health and family well-being: not only do culinary traditions and knowledge directly affect household nutrition, but storage and preservation also considerably lengthen the “shelf-life” of both gathered and cultivated food and are therefore essential to ensuring food security. Studies show that women’s methods of preparing, preserving, and storing food plants often correlates with scientific knowledge about fermentation, drying, smoking, salting, and using herbal preparations against insect attack.

While much ethnobotanical research investigates the ways in which plants are consumed as foodstuffs, there is little research that investigates the specialized ethno-botanical knowledge and related skills underpinning domestic practices in food storage, preservation, and preparation techniques. These practices require in-depth knowledge of plant characteristics and of environmental factors affecting processed plants. It is still infrequent that the specific ways in which plants are transformed and consumed are linked to the associated practices and knowledge, or to the domestic sphere, or to women. The preservation of women’s knowledge and skills in post-harvest tasks is just as vital to the conservation of PGR as the preservation of crops *in situ* for, without this, these plants are no longer useful to people.



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### Bibliography

Akoroda M. O. (1990). Ethnobotany of *Teifairla occidentalis* (Cucurbitaceae) among Igbos of Nigeria. *Economic Botany* **44**(1), 29–39. [This presents a gender-sensitive ethnobotanical study on the importance of this little-known crop.]

Alexiades M. N. (1999). *Ethnobotany of the Ese Eja: plants, health and change in an Amazonian society*, 467 pp. Ph.D. Dissertation, City University of New York. Ann Arbor, Michigan: University Microfilms International. [This is an in-depth ethnobotanical study of medicinal plant use including an unusual focus on women and on cosmology.]

Ashby J. A., Quiros C. A., and Rivera Y. M. (1987). *Farmer participation in on-farm varietal trials*, 30 pp. London: Overseas Development Institute, Agricultural Administration and Extension. Network Discussion Paper No. 22. [This is one of the first publications to show sex differences in seed selection criteria.]

Barry H. and Schlegel A. (1982). Cross-cultural codes on contributions by women to subsistence. *Ethnology* **21**(2), 165–188. [This is one of the few statistical studies on the roles of women in subsistence and plant production in traditional societies.]

Berg T. (1992). *Indigenous knowledge and plant breeding in Tigray, Ethiopia*. Centre for International Agricultural Development (NORAGRIC), Agricultural University of Norway, FORUM for Development Studies No. 1, 1992, pp. 13–22. [This is one of the few studies showing women's roles in seed selection in Ethiopia, a center of genetic diversity.] ©Encyclopedia of Life Support Systems (EOLSS)

Boster J. S. (1985). Selection for perceptual distinctiveness: evidence from Aguaruna cultivars of *Manihot esculenta*. *Economic Botany* **39**(3), 310–325. [This is a seminal article looking in-depth at women's selection criteria and taxonomies in a traditional society.]

Browner C. H. and Perdue S. T. (1988). Women's secrets: bases for reproductive and social autonomy in a Mexican community. *American Ethnologist* **15**(1), 84–97. [An often cited study reporting on women and men's knowledge of medicinal plants related to women's health showing how men's extensive knowledge is related to power relations.]

Brush S. B. (1995). In situ conservation of landraces in centers of crop diversity. *Crop Science* **35**(2), 346–354. [This presents expert concepts and hypotheses regarding reasons that farmers conserve folk varieties.]

Brush S. B., Taylor J. E., and Bellon M. R. (1992). Technology adoption and biological diversity in Andean potato agriculture. *Journal of Development Economics* **39**, 365–387. [This tests hypotheses regarding reasons why farmers do and do not conserve folk varieties.]

Cleveland D. and Murray S. (1997). The world's crop genetic resources and the rights of indigenous farmers. *Current Anthropology* **38**(4), 477–515. [This is one of the first articles to indicate the importance of indigenous rights systems for international debates on farmers' rights to PGR.]

Davidson-Hunt K. (1999). Class, gender and the commons in the Indian Himalayas. In J. Sinclair, F. Berkes, and J. Gardner, eds. *Sustainability of Mountain Environments*, online publication, University of Manitoba, Canada. [http://www.umanitoba.ca/academic/institutes/natural\\_resources/mountain/book/index.html](http://www.umanitoba.ca/academic/institutes/natural_resources/mountain/book/index.html) [This study illustrates different foraging resource use patterns and conflicts arising both between men and women, and between women of different castes.]

Dick-Bissonnette L. E. (1997). *Foothill Yokoch, Mono, and Miwok women: an anthropological perspective*, 478 pp. Ph.D. Dissertation, University of California, Santa Barbara. Ann Arbor, Michigan: University Microfilms International. [This in-depth anthropological study explores gender relations and women's status in relation to PGR management.]

Greenberg L. S. (1996). *You are what you eat: ethnicity and change in Yucatec immigrant house lots, Quintana Roo, Mexico*, 441 pp. Ph.D. Dissertation, University of Wisconsin-Madison. Ann Arbor: University Microfilms International. [This presents one of the first in-depth studies on the cultural importance of homegardens, culinary traditions and women's domestic work.]

Kothari B. (1996). *Towards a praxis of oppressed local knowledges: participatory ethnobotanical research in indigenous communities of Ecuador*, 310 pp. Ph.D. Dissertation, Cornell University. Ann Arbor, Michigan: University Microfilms International. [Presents an in-depth study of medicinal plant knowledge and use with a critical focus on gender and women.]

Niñez V. K. (1987). Household gardens: theoretical and policy considerations. *Agricultural Systems* **23**, 167–186 [This is an often cited summary of conceptual and practical aspects of homegardening worldwide from a person renowned in this field.]

Price L. L. (1997). Wild plant food in agricultural environments: a study of occurrence, management and gathering rights in Northeast Thailand. *Human Organization* **56**(2), 209–221. [This presents one of the first in-depth studies of plant gathering rights and women's relations with wild plant management.]

Rasmussen S. J. (1998). Only women know trees: medicine women and the role of herbal healing in Tuareg culture. *Journal of Anthropological Research* **54**(2), 147–171. [An example of a study looking at gender differences in folk medicine and medicinal plant use.]

Sillitoe P. (1981). The gender of crops in the Papua New Guinea Highlands. *Ethnology* **20**, 1–14. [This is probably the first study to examine the influence of gender relations on folk plant taxonomic systems.]

Song Y. (1998). “New” seed in “old” China. *Impact of CIMMYT Collaborative Programme on maize breeding in South-western China*, 250 pp. Ph.D. Thesis, Wageningen Agricultural University, the Netherlands. [This study highlights not only the predominant role of women in Chinese agriculture, but how gender relations affect the management of modern and “folk” varieties.]

Sperling L. and Berkowitz P. (1994). *Partners in Selection: Bean Breeders and Women Bean Experts in Rwanda*, 24 pp. Washington, DC: CGIAR. [This is an in-depth study showing the problems and prospects of involving women farmers in a participatory plant breeding programs.] ©*Encyclopedia of Life Support Systems* (EOLSS)

Swaminathan M. S. ed. (1998). *Gender Dimensions in Biodiversity Management*, 229 pp. Delhi: Konark Publishers Pvt. Ltd. [This book is one of the first to present a series of case studies on gender and PGR management in India.]

Tapia M. E. and Torre A. de la (1993). *La mujer campesina y las semillas Andinas*, 48 pp. Rome: FAO. [This is the first study to focus on women's roles in Andean seed management systems, and on cosmological explanations for this role.]

Wilson-Moore M. (1990). *Subsistence, Patriarchy, and Status: Women's Work In Homestead Gardens in Northwest Bangladesh*, 342 pp. Ph.D. Dissertation, Southern Methodist University. Ann Arbor, Michigan: University Microfilms International [This research critically examines the idea that homegardening is purely a women's domain and increases women's status in Bangladesh.]

Wooten S. R. (1997). Gardens are for Cash, Grain is for Life: The Social Organization of Parallel Production Processes in a Rural Bamana Village (Mali), 380 pp. Ph.D. Dissertation, University of Illinois at Urbana-Champaign. Ann Arbor, Michigan: University Microfilms International. [This thesis examines trade-offs between men's and women's gardening as market gardening increases.]

Zimmerer K. S. (1991). *Seeds of Peasant Subsistence: Agrarian Structure, Crop Ecology and Quechua Agriculture in Reference to the Loss of Biological Biodiversity in the Southern Peruvian Andes*, 529 pp. Ph.D. Dissertation, University of California, Berkeley. Ann Arbor, Michigan: University Microfilms International [This represents the most in-depth research to date on Andean PGR management and includes

a detailed gender-perspective.]

### **Biographical Sketches**

**Prof. Dr. Patricia Howard-Borjas** is Chair of the Department of Gender Studies in Agriculture at Wageningen University in the Netherlands. She holds a Masters' Degree in Regional and Urban Development Planning from the University of California at Los Angeles, and a Ph.D. in Sociology from the University of Wisconsin-Madison. Prof. Dr. Howard-Borjas worked for 10 years in the Central American region where she carried out extensive research on environmental degradation and agrarian restructuring due to the expansion of cattle ranching. She also worked for various United Nations agencies assessing and programming Women-in-Development efforts in rural areas, particularly focusing on gender-environment relations. Prof. Dr. Howard-Borjas then worked for five years at FAO Headquarters in Rome, Italy in the Women in Agricultural Production and Rural Development Service, where she acted as gender trainer and helped to develop various initiatives related to training as well as gender and environment. In 1995 she assumed the position of Professor and Chair of Gender Studies in Agriculture at Wageningen University. In this capacity she initiated a research program on gender and local plant genetic resource management together with the International Board on Plant Genetic Resources (Rome, Italy) and the Royal Tropical Institute in Amsterdam. The program is assembling and reviewing a large body of scientific material that deals empirically with people-plant relationships and specifically women in order to define the current state-of-the art of knowledge in this field. Prof. Dr. Howard-Borjas is also leading an international collaborative research program on changes in labor and gender relations with the conversion to organic and sustainable agriculture. She is a member of the Dutch Government's Advisory Council on Spatial Planning, Environment and Nature.

**Ir. Willemijn Cuijpers** holds a Masters' Degree in Environmental Sciences from Wageningen University in the Netherlands. After finishing her degree she carried out European Union-funded research on gender and medicinal plant use and conservation in the lowlands of Guatemala. Subsequently she has been a research assistant on gender and local plant genetic resource management for the Dept. of Gender Studies in Agriculture.