

Women Farmers and Andean Seeds

Mario E. Tapia *and* **Ana De la Torre**



Women Farmers and Andean Seeds

Mario E. Tapia *and* **Ana De la Torre**



The **Food and Agriculture Organization of the United Nations (FAO)** is the specialized Agency responsible for agriculture, forestry and fishery worldwide. FAO has the mandate to promote a sustainable agriculture and rural development, as well as food security for the whole population. It extends the mission to assure that women – together with men – have the access to necessary resources and receive the support to obtain sustainable means of sustenance and to improve life quality.

The **International Plant Genetic Resources Institute (IPGRI)** is an autonomous international scientific organization, supported by the Consultative Group on International Agricultural Research (CGIAR). IPGRI's mandate is to advance the conservation and use of plant genetic resources for the benefit of present and future generations. IPGRI works in partnership with other organizations, undertaking research, training and the provision of scientific and technical advice and information.

© FAO, Food and Agriculture Organization of the United Nations
© IPGRI, International Plant Genetic Resources Institute

Photographs: Mario E. Tapia (Cover and text)

Printed 1998
(Translation of Second Edition, December 1997)
ISBN 92-9043-378-7

IPGRI
Via delle Sette Chiese 142, 00145 Rome, Italy

Contents

Introduction to the series	4
Foreword	5
Introduction	6
Women and plant domestication	9
The Andean environment and cultivated varieties	11
Who does what in agricultural labour?	15
The seed fairs	17
Conservationist women	19
Juana and the processing of bitter potatoes	19
Rosa and the different flavours of potatoes	20
Maria and the varieties of oca	22
“The three and the five” of seeds: knowledge and skills	24
To whom do the seeds belong?	24
What is the woman’s duty to the seeds?	25
Selection: the three and the five	26
Traditional storage practices	29
Each variety has its use	31
How are the skills and knowledge acquired?	36
Opinions about modern seed storage	36
Conserving diversity contributes to food security	38
Women and seed conservation in Agenda 21	41
Advances and future possibilities	42
Bibliography	44

Introduction to the series

In 1996, representatives of 150 countries, members of the FAO Conference, gathered in Leipzig, Germany and adopted the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture. Member countries agreed that agrobiodiversity conservation policy should consider the needs and rights of rural communities to develop, access and use biological resources.

The Global Plan of Action provides a clear call to include gender factors in all areas dealing with participatory approaches to the conservation and use of genetic resources. The full participation of rural women and men in management of genetic resources is an effective way to link biodiversity conservation to sustainable development and the reduction of rural poverty.

A joint IPGRI/FAO Working Group Meeting held in Rome in October of 1996 was one of the first attempts to link the agreements approved at Leipzig to practical action. The meeting drew on staff from IPGRI, the CGIAR Gender Programme, FAO and experts in the fields of gender analysis, plant genetic resources and rural development to develop a strategy for implementing the gender aspects of the Global Plan of Action. One of the tasks in that strategy is to build the fund of practical knowledge and experience regarding gender and genetic resources management.

This Series is a key means to generate and disseminate knowledge to bring gender perspectives into the mainstream of agrobiodiversity conservation and use.

Foreword

In rural areas, the conservation and use of plant genetic resources begins with women. As smallholder farmers, women are involved in all areas of the crop cycle from seed selection to planting, harvest, storage and processing. Within the household, women are responsible for food needs and welfare, including the gathering and utilization of food, fodder, fuel, medicinal plants and fibre. In these roles, women often determine which plant resources to conserve and use, which seed to select, which crop varieties to grow, which food products to keep for home consumption and which to sell at the local market.

As illustrated by this case study of women farmers and seed in the Andes, rural women have a special interest in the diverse and multiple uses of plants and other biological resources, given their varied and complex responsibilities in rural households. The knowledge acquired as managers of these resources for livelihood, health and food security constitutes a knowledge system that both ensures subsistence and community needs, and contributes to the conservation and use of local varieties.

In many cases, PGR conservation efforts have lacked a critical gender dimension, ignoring potentially rich information on the knowledge, skills and practices of women. Undervaluing of the substantial contribution of women in the conservation and management of plant genetic resources has weakened PGR conservation strategies. This series addresses this shortcoming, by documenting women's knowledge and genetic resources management systems. This increased understanding may serve as the first step toward developing conservation strategies which are relevant to the needs and livelihoods of rural women.

Pablo Eyzaguirre
IPGRI

Introduction

*We are too accustomed to seeing the Andean peasant in relation to his problems instead of his potentials or alternatives.
We can not speak about natural resources without looking at the society related to these resources.*

Ana De la Torre, 1988

This publication had its principal inspiration from the thoughts of Ana De la Torre, an anthropologist from Cajamarca, Peru who dedicated her life to promoting the value of traditional knowledge. She knew how to put the main emphasis on rural women and enhance their enormous contribution in caring for biodiversity. Ana is no longer with us, but her ideas remain.

Biodiversity is a central issue of rural development in which nature and society can be perceived as different dimensions of a single reality.

In the context of “faddish” alternatives which can hypothetically improve life quality in rural areas, it appears that women farmers are still the curators of traditions, and that they can either stop or impel any change. They are the ones who know best about biological diversity, about the use of vegetal products in food and in traditional medicine and they will also in most cases decide about land use, cropping and the destination of harvested products.

Women of peasant communities in Peruvian highlands perform almost 70% of the family farmwork, including planting, cultivating and harvesting. They also do the selection, storage, food processing and even raise the livestock. Although they have less access to education and formal training than men, they have the major share of responsibility in assuring the survival, welfare and health of their families.

In order to fully understand the responsibilities and attitudes developed by a rural woman - as part of an Andean peasant family - in the conservation of plant genetic resources, it should be remembered that the Andes are a mountain system with a high-altitude agriculture situated in a very diverse ecological environment, and that food security is based on adequate use of biodiversity.

It is only by specifying the characteristics of the Andean rural population to which the women belong, and by knowing the socioeconomic facts of the agricultural systems where they act, that it is possible to understand the important role played by women and to measure their direct relation with the conservation, evolution and use of Andean plant genetic resources.

In the past, women around the Andes region have helped to domesticate numerous crops that are all very important to ensure food security around the world – in particular maize and eight different types of potatoes which have received wide attention in western agricultural research. In addition, women maintain in their family plots other indigenous crops, allowing them to diversify daily food and to improve the nutritional level of the family, as well as to secure a more rational and intensive use of their fields.

Nowadays, women's participation in seed fairs – which are being held in many Andean places - confirms today's presence of biodiversity in the Andean world. Seed fairs are a strategy to promote the conservation and increased use of plant genetic resources. The examples of three women, each one living in a different ecological environment and helping with their daily work to conserve plant genetic resources, will corroborate this.

The selection and conservation of seeds requires knowledge and skills, in most cases developed and transmitted from generation to generation. This wisdom is expressed in the concept of "the three and the five" gathered by anthropologist Ana De la Torre from Cajamarca University, thanks to her close relations with women farmers of all ages.

Humanity depends on all the biological resources of the world for its survival and biodiversity offers the possibility to increase food supplies. It is therefore necessary to make special efforts, not only to conserve the biodiversity and ensure its proper use, but also to give women strong support to become agents of change, using their knowledge.

TRAVAXO PAPAOCATARPVIDACHA



Pre-Hispanic women planting potatoes and covering them with earth. Drawing taken from the 17th century chronicler Guamán Poma de Ayala.

Women and plant domestication

The beginning of agriculture in the Andes – as in the rest of the world – occurred when nomadic families, particularly the women, observed new plants germinating from seeds of wild plants. This happened more frequently around settlements, owing to the abundance of organic matter. It can be supposed that the incipient agriculturists were aware that introducing grains, tubers and roots into the ground, rather than eating them, would allow their reproduction.

Since ancient times, seeds have been related to femininity and reproduction. The well known Peruvian historian Maria Rostworowski (1988) relates a myth from the region of Cajatambo and makes the following commentaries:

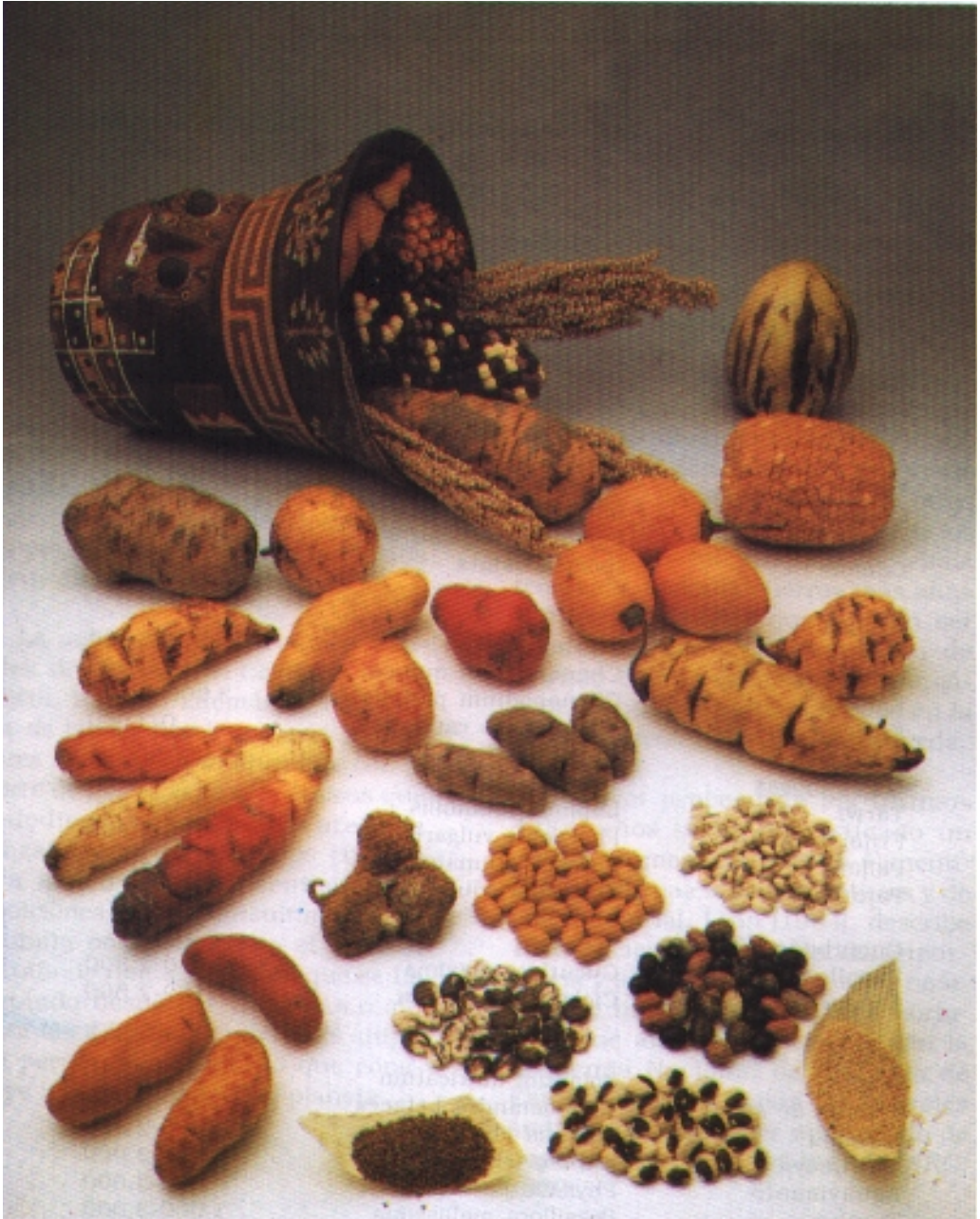
“The feminine and divine element represents the fruitful and prolific mother; not in vain was the earth called Pachamama (mother earth) in the Quechua language, the sea Mamacocha, the moon Mama Quilla and also all the plants useful to humans were called and adored by the name Mama (mother): Mama sara (maize), Mama acxo (potato), Mama oca (oca, a native Andean tuber), Mama coca (coca shrubs).

An example of the cult to femininity, and the woman who fills her children with goods, is the myth of the goddess Raiguana. Natives tell that in ancient times humans had nothing to eat and – in order to obtain food – they asked Yucyuc for help. Yucyuc was a little bird with a yellow beak and feet, smart enough to obtain the seeds of staple crops kept by Mama Raiguana. To achieve this, Yucyuc requested from Sacracha (another bird) a handful of fleas which he threw in the eyes of the goddess. Raiguana sobbed her eyes out and for a moment lost her son called Conopa.

An eagle caught the child from his mother’s arms. Raiguana had to promise to share the seeds with the humans if she wanted to have her son back. To the people of the highlands she gave potatoes, oca, olluco, mashua (native tubers) and quinua (native grain), while the coastal habitants received maize, cassava, sweet potatoes and beans.”

Although no mention is found in chronicles about seed management in pre-Hispanic times, it may be assumed to have been a woman’s duty. Proof of this could be the drawings of Guaman Poma de Ayala, which show the woman always associated with seeds: she is the one who places potatoes and grains of maize in the ground.

With the arrival of the Europeans in the Andes, the women lost importance and became the basis of resistance. Men’s affairs were more exposed and therefore more easily attacked. The Andean woman continued to keep her affairs silent: her arts and skills, such as textile production, but especially the selection and conservation of seeds. At the same time she made sure that these skills and knowledge would be handed down to the new generations.



The diversity of Andean crops: tubers, grains, legumes and fruits.

The Andean environment and the cultivated varieties

The extended mountain range of the Andes – some 6000 km long and covering more than 2 million km² - has determined the existence of a great number of ecological microzones and climates, suited to the development of a varied vegetation.

The subregion of the Central Andes, stretching from south of Colombia to Bolivia, was the stage for some of the most important civilizations from the New World. Different ethnic groups were continually involved in the domestication of crops to ensure nutrition in the rough conditions of high-altitude agriculture, not commonly found elsewhere. It is an agriculture adapted to altitudes ranging from 1500 to 4200 m asl (in the Peruvian-Bolivian high plateau).

In this environment of high diversity, the Andean population, and more specifically the women, practised the selection of numerous varieties of maize, potato and other species adapted to a wide array of climates. They made it possible to use fertile inter-Andean valleys with mild climates, as well as fields situated at high altitudes exposed to cold weather. Furthermore, they learned to cultivate in soils ranging from sandy, acid to alkaline, with a high or poor content of organic matter.

Throughout the last 4000 years more food species have been domesticated, as have species with medical and industrial uses and those used as condiments. Leon (1964) describes 12 crops of importance and adds a list with the names of 20 fruits and vegetables which are still being cultivated. In the opinion of the United States National Research Council, as many as 31 species could have an important potential at world level (NRC 1989).

Other authors believe that at least 160 species were commonly cultivated in pre-Hispanic times for food or medical purposes and to produce fabrics, tools and housing; their list is based on writings of early chroniclers and also on drawings found on ceramic pieces (Yacovleff and Herrera 1934; Cardenas 1989).

Owing to this broad biodiversity, the pre-Hispanic Andean population was able to manage its heterogeneous ecological environment through the use of a wide diversity of plant ecotypes, which constituted the base of the so-called "peasant varieties", sometimes referred to as "landraces." In addition to the better-known maize and potato crops, they maintained varieties of other species like tubers (oca, olluco, mashwa), roots (arracacha, yacon, chagos, maca), fruits (pepino, tomato tree, goldenberry) and condiments (chilies and roqoto). This permitted them to obtain the development of an indigenous agriculture situated in a rough environment not suited to agriculture of high-energy input, but adapted to the existing ecological and socioeconomic conditions, ensuring adequate quality and quantity of nutrition for the population.

Food species originated and cultivated in the Andean region

Common name	Scientific name	Growing altitude (m asl)
Tubers		
Potato	<i>Solanum andigenum</i>	1000 - 3900
Bitter potato	<i>Solanum juzepczukii</i>	3900 - 4200
Oca	<i>Oxalis tuberosa</i>	1000 - 4000
Olluco	<i>Ullucus tuberosus</i>	1000 - 4000
Mashwa	<i>Tropaeolum tuberosum</i>	1000 - 4000
Roots		
Arracacha	<i>Arracacia xantorrhiza</i>	1000 - 3000
Achira	<i>Canna edulis</i>	1000 - 2500
Ajipa	<i>Pachyrhizus tuberosus</i>	1000 - 2000
Yacon	<i>Polymnia sonchifolia</i>	1000 - 2500
Chago	<i>Mirabilis expansa</i>	1000 - 2500
Maca	<i>Lepidium meyenii</i>	3900 - 4100
Sweet potato	<i>Ipomea batata</i>	0 - 2800
Grains		
Maize	<i>Zea mays</i>	0 - 3000
Quinoa	<i>Chenopodium quinoa</i>	0 - 3900
Kaniwa	<i>Chenopodium pallidicaule</i>	3200 - 4100
Amaranth	<i>Amaranthus caudatus</i>	0 - 3000
Legumes		
Tarwi	<i>Lupinus mutabilis</i>	500 - 3800
Beans	<i>Phaseolus vulgaris</i>	100 - 3500
Lima bean	<i>Phaseolus lunatus</i>	0 - 2500
Basul	<i>Erythrina edulis</i>	500 - 2700
Cucurbits		
Squash	<i>Cucurbita maxima</i>	500 - 2800
Caygua achoqcha	<i>Ciclanthera pedata</i>	100 - 2500
Fruits		
Pepino	<i>Solanum muricatum</i>	800 - 2500
Tomato tree-Tamarillo	<i>Cyphomandra betacea</i>	500 - 2700
Lucuma	<i>Lucuma abovata</i>	0 - 2500
Chirimoya	<i>Annona cherimola</i>	500 - 2000
Goldenberry	<i>Physalis peruviana</i>	500 - 3000
Tumbo	<i>Passiflora mollissima</i>	1500 - 3000
Tintin	<i>Passiflora pinnatispula</i>	2500 - 3800

With relation to the Peruvian Andes, 18 agro-ecological zones have been described by Tapia (1996) based on the geographical works of Pulgar Vidal (1946). Each agro-ecological zone is determined by variables such as latitude, altitude and exposure (either inter-Andean or the western or eastern slopes of the Andes) and each has its own particular conditions regarding land use. This agro-ecological zonation establishes a relation between each agro-ecological zone and the presence of plant species and even certain varieties as indicators. Fruits like pepino, lucumo, chirimoya and native cotton are the indicative species of the low agro-ecological zone, called Yunga (1500-2500 m asl), which typically has a mild climate without frost, but with xerophytic conditions requiring irrigation to make soils productive for agriculture.

Maize is the prototype crop of the Quechua agro-ecological zone (2500-3200 m asl). Some varieties are better adapted to the fertile soils and humid conditions of the Urubamba valley in Cusco (for example 'Blanco Imperial'), other varieties are acclimatized to the dry Quechua zone of the Colca valley in Arequipa ('Cabanita' maize). But 'Confite Puneño' is a variety highly tolerant of low temperatures and is grown at altitudes between 3600 and 3900 m asl; its characteristics are related to the process of acclimatization to cold temperatures (Manrique 1991).

Among the most studied Andean plant genetic resources are the potato species. Potato is the prototype crop of the Suni agro-ecological zone together with the Andean tubers oca, olluco and mashua. The number of potato species is referred to as 3 or 18, depending on the classification system (Brush *et al.* 1981). However, the system most often used is the one proposed by Hawkes (1983), which is based on the plant's genetic origin; the author suggests eight different species of potatoes. This varied genetic material, cultivated for centuries by pre-Hispanic family groups called *ayllu* and its current descendants, permitted the adaptation of potatoes to different environments including:

- The humid occidental slopes of the Andes
- The dry conditions of the inter-Andean valleys in Peru's southeastern subregion
- The surroundings of lake Titicaca and its high plateau, with very variable precipitation amounts
- The coldest conditions in the Puna zone at altitudes above 3900 m asl. It is most probably in this region where the domestication of the so-called "bitter potatoes" (*Solanum juzepczukii* and *S. curtilobum*) took place; bitter potatoes resist temperatures as low as -3°C during the growing time of the plant and are adapted to the Puna conditions of Peru and Bolivia.

The recovery and current use of this material is possible because more than 5000 peasant communities still exist in the Peruvian Andes (there are an estimated 2000 in Ecuador and 3000 in Bolivia). These social organizations are made up of families with a common ancestral origin

which have maintained the components of traditional agriculture in the context of an agrarian society (PRATEC-PPEA 1991). They have also preserved and added to crop genetic diversity during the last few centuries. This confirms that the native populations protect genetic resources, as mentioned by Altieri and Merrick (1987), despite the lack of attention of Andean governments toward mountain agriculture.

The survival of peasant communities makes it also possible for numerous scientific expeditions to easily collect the genetic resources – which have been nursed for centuries in the farmers' fields- to be deposited in genebanks and used in the creation of new crop varieties. It is frequently observed that diversity of crops and varieties is less in those areas where big private farms had dominated in the past.

It is most important to recognize not only the actual existence of a high number of species, but also the fact that for centuries varieties were selected for qualities such as flavour, which is directly related to women's labour of food preparation. Other factors which contributed to their continued evolution were tolerance to certain diseases, soil characteristics and climatic conditions. Therefore, the Peruvian Andes, as well as those of Colombia, Ecuador and Bolivia, should be recognized as a centre of megabiodiversity and a generator of new germplasm, similar to the greenhouses of hundreds of research institutes all over the world (Tapia *et al.* 1979; Tapia 1990). A worldwide special support is needed to preserve this type of agriculture, particularly within the current conditions where biodiversity is endangered owing to trends toward specialization and homogeneity (Altieri and Merrick 1987).

Who does what in agricultural labour?

Andean agricultural production is characterized by organized work of the peasant family which as a whole is responsible for soil preparation, seeding, crop labour, harvesting, storage, utilization and also commercialization of the variable surplus. Work is intensive and requires the corporate participation of all family members. In turn, work reciprocity practices called *ayni* and *minka* consist of the mutual participation and collaboration of several families as a way to share the heavy work of soil preparation and harvesting, which can be better completed by several families.

In the execution of these duties a major responsibility may be assigned to some family members. Because of the frequent absences of men – who often search for some additional income in cities or big farms - women may perform most of the farm work, in some areas up to 70%.

Transmission of knowledge about techniques such as soil preparation and fertilization occurs naturally. Women participate more actively in the methods of seed selection and storage.

Experiences in the northern mountain region of Peru show that in traditional communities such as Chetilla in Cajamarca, it is clear that the duties of seed selection and storage belong exclusively to women (De la Torre and Cuzco 1989).

In the traditional peasant communities of southern Peru, the harvest work in communal fields – called *laime* (in the Quechua language) or *ainoka* (aymara) – is shared by all family members, but women are in charge of the selection and administration of obtained products. This includes separating products for food necessities, selecting them for selling and choosing the seeds for the next

What does gender issue mean?

The term “gender” refers to the roles and social responsibilities at family level, which are learned and changeable and may vary widely within and between cultures. “Gender” is not the same as “sex”, which refers to differences between men and women which are both biological and fixed.

Gender roles are learned behaviours in a given society, based on social conditioning about which activities are considered appropriate for males and which are appropriate for females. Gender roles are not fixed; they can and do change in response to changed societal conditions.

Gender analysis is a tool for discovering useful data about the characteristics of a sample population. It works by examining the activities, responsibilities, opportunities and constraints in the life of each member of the sample. To give an idea of how it works, the key questions are: WHO does WHAT? And WHEN?

Gender analysis draws on social science tools, especially economics, geography, sociology and anthropology. When it is used properly it can increase the accuracy of scientific outcomes.

(Taken from “Geneflow, 1991. Women and plant genetic resources”. IBPGR, Rome).

campaign. Seed preparation means propagation of the native varieties as well as the new ones to be introduced to the family plot.

Among the Aymara people of the southern Andes, men help in the classification of the tuber seed and show more interest toward the introduction of new varieties. This work distribution is very much related to factors both traditional and socioeconomic. However, when it comes to listing the potato varieties existing in the Bolivian high plateau, women clearly manage more information than men (Rea 1988).

The seed fairs

The tradition of holding weekly agricultural fairs is still very strong in the majority of district and provincial towns in the Andes; also annual fairs take place in bigger capital cities. At these fairs, farmers from the surrounding areas offer and exchange their surplus products, and buy basic goods. Still today, these activities favour the exchange of genetic material between families who come from different ecological zones, and who are looking for new seeds to replace the exhausted ones (Brush and Taylor 1992). Since women are in charge of managing the surplus and making the exchanges, they of course also select the products that are traded.

Based on the tradition of agricultural fairs it has become common to organize "seed fairs" which reward and stimulate the maintenance of diversity (Tapia and Rosas 1992). Seed fairs are held in different places of the Peruvian sierra once a year, generally just after harvest time.

The following steps are used in the organization of the event: farmers, both women and men, are invited officially through village authorities to participate and to display their genetic material, including the best varieties as well as the greatest diversity they possess. A contest takes place between the participants of the villages belonging to a watershed. The farmers, women or men, who bring not only the greatest variability, but who also prove to have the most complete knowledge in relation to the production, storage and use of their crops, will be rewarded.

It seems that the fairs are an appropriate methodology to stimulate the *in situ* conservation of plant genetic resources and a way to incite the participation of the farming family in the conservation of genetic resources. The important role played by women in the selection of varieties becomes evident; one of the reasons for their interest is to have the local ingredients required to prepare the traditional dishes for daily family nutrition.

An additional result of the fairs is the recognition given to those women or their families who are particularly active as "conservationists" and who conserve these materials with greater dedication. These women or families are generally well known by their neighbours and if a family happens to lose genetic material for climatic or social reasons (theft), diseases or mischance, they will turn to the conservationists to recover some seeds. There are even cases where older women know how to propagate potato from botanical seeds, as a way of increasing diversity and selecting new varieties (IBPGR 1991).

In Cajamarca (northern part of Peru), several seed fairs have been held with the support of the National Institute of Agricultural Research and local NGOs. A systematic and continuous process of evaluation of the plant genetic material is being carried out in the area of La Encañada watershed (Cajamarca), promoted by Aspaderuc (Association for Rural Development of Cajamarca), supported by CONDESAN (Consortium for Andean Development). Since 1990, eight annual seed fairs have been organized in

La Encañada district and in 1993, a total of 1600 varieties or ecotypes belonging to 12 Andean native crops were exhibited.

Even if the presence of unaccompanied women does not exceed 25% at the seed fairs, it is known that wives accompanied by their husbands will identify the varieties brought to compete. When women decide to participate by themselves, they do it individually or as members of "Mother's Clubs".

The future of these fairs depends on how much they will constitute real events of genetic material exchange. They require support to stimulate the participation of farmer families and women coming from the different agro-ecological zones of each region.

Conservationist women

Very few individual studies have been carried out that show the history, reasons and concrete facts about women's participation in plant genetic resource conservation. The following brief stories, however, tell about the daily work of three Andean women and their contribution to the preservation of genetic resources.

Juana and the processing of bitter potatoes

On the high plateau of Peruvian Puno, in fields situated as high as 3800 m asl, agriculture has to endure the worst climatic risks. In the zone called Puna, sufficient humidity, low temperatures and frosts during the growing season of the plants are frequent. Therefore, in ancient times, potato varieties which had in their origin been crossed with frost-resistant wild potatoes (*S. acaule*) were domesticated. These are the "bitter potatoes" of which some 15 000 ha are being cultivated.

Farmers of the Aymara community of Santa Maria (Puno) maintain their traditional organization of farming and in the lower parts and mountain slopes they cultivate individual parcels called *sayana*. The plots in higher areas are called *aynoka* where cropping is done mostly to produce bitter potatoes. These contain water-soluble glycoalkaloids and therefore need to be processed prior to consumption. This is achieved by exposure



The women are selecting bitter potatoes in the Peruvian high plateau.

to intensive night frost, followed by trampling on the tubers to squeeze out the water released by freezing and finally by drying in the sun. The process is a natural lyophilization, by which a product called *chuño* is made that can be stored for years as a staple food.

Juana keeps some six varieties of bitter potatoes and explains the selection process undertaken each year to store the seeds. From the tubers she will choose the ones which are suitable for preparing *tunta* or *moraya*, the white *chuño*. These are of superior quality because in the process of freeze-drying, the frozen tubers are soaked for 2 weeks in river water. As she points out, people prefer the 'Piñaza' variety to make white *chuño*, while the 'Parina' and 'Rucki' varieties are more suited to make black or ordinary *chuño* and have a higher dry matter content.

Rosa and the different flavours of potatoes

It may seem that there is less potato diversity in Cajamarca than in the southern part of Peru. However, the results of the seed fairs have made it evident that some women can sort as many as 56 potato varieties, as is the case of Rosa, who lives in the Usnio hamlet. In her plots she grows eight commercial varieties which she has added over the years, "nursing" them together with her 24 native potatoes, because "all of them are good, one just has to find out where and in which kind of soil they prefer to grow." Rosa has introduced the commercial varieties of potatoes, some of which have existed for 25 years, but she has not given up her native varieties.

During festivities or when she wants to pay special attention to some guests, Rosa will cook and serve native potatoes as a delicacy, since they



Native potato varieties have different forms, colours and flavours. Sample from a potato plot in Cajamarca.

taste better and are not as *aguachinientas* (watery) as the commercial ones. She prefers to grow the variety called 'Conda Negra'; although of little yield, it gives a unique taste to soups. In her opinion, native potatoes yield less than the introduced ones, but never fail to produce and require fewer pesticides.

The 32 potato varieties cultivated by Rosa in 1992

Commercial varieties	Farmers' varieties	
Renacimiento	Sapa blanca	Sapa negra
Mariva	Chinuina oqe	Changarita
Yungay	Conda negra	Clavelina
Cholanday	Maropolla negra	Chaucha
Andina	Limeña	Huevo de toro
Revolución	Cacho de vaca	Lengua de vaca
Perricholi	Chilumaina	Huairo
Liberteña	Caigaya	Cajibambina
	Anacuda	Chiquibonita
	Lisimacuay	Peruana
	La cal	Choiga
	Oqe	Wagalina

Maria and the varieties of oca

... all the potatoes are good, you only need to find where and in which soil to plant them

Andean women have kept – together with potatoes – other tubers also native to the Andes which are well adapted to soil and climate conditions, fairly tolerant to pests and a useful food insurance. Oca, olluco and mashwa are grown in crop rotation following potatoes, and use the residual fertilization. Furthermore, they are tolerant to most plagues and do not require such large amounts of pesticides as commercial potatoes. These tubers are mostly cultivated in *melgas* which are beds with complex spatial arrangements and different crops, allowing different harvesting times and therefore securing the tuber's storage for a longer period.

Maria lives in the community of Chamis; she counts 28 varieties of oca and keeps them all because “each one has a special flavour and if one of them happens to be attacked by the *gorgojo* beetle, others will be more resistant and be saved.” In addition to potatoes and ocas, she also grows a diversity of beans and maize, because this is the only way to produce enough food in her plots of only 1.5 ha.

The cases of these rural women are just a small example of the silent but efficient work done year after year by some 100 000 women all over the



Maria from Chamis classifies with much care her varieties of oca to get them ready for the seed fair.

Peruvian Andes, to conserve and even enrich plant genetic resources. Owing to the care and knowledge they display, it would be justified calling them “conservationists of native Andean seeds”.

Oca varieties (*Oxalis tuberosa*) kept by María, from Chamis

Chaucha redonda (Round Chaucha)	Pimpinela rosada (Pink Pimpinela)
Blanca redonda (Round White)	Lantena
Rosada (Pink)	Famosa (Famous)
Zapallo (Squash)	Clavelilla colorada (Red Clavelilla)
Chaucha blanca (White Chaucha)	Pimpinela blanca (White Pimpinela)
Piña roja (Red pineapple)	Celendina (from Celendin)
Negra centro amarillo (Black with yellow flesh)	Viuda (Widow)
Manay	Chaucha negra (Black Chaucha)
Blanca (White)	Piña morada (Purple pineapple)
Colorada (Red)	Juanita
Faviana	Hormiga (Ant)

“The three and the five” of seeds: knowledge and skills

Numerous field comparisons show how much women’s participation in seed conservation goes further than domestic duties and that this participation has two fundamental orientations. First, women play an essential role in production thanks to their knowledge and technical skills of agricultural activities. Second, the transmission of this knowledge to new generations secures the retention of culture.

A survey of women belonging to different generations (grandmothers, mothers-in-law, mothers, daughters and granddaughters), belonging to 10 families in four Andean communities of Cajamarca, provided information about seed selection and storage techniques.

Surprisingly, grandmothers, mothers-in-law and granddaughters showed great satisfaction in providing information, but young women and mothers seemed somehow reserved. This may be due to their fear of showing their limitations in front of their mothers-in-law, who complained that the “daughters-in-law no longer fulfill their chores properly, neither do they have to pass difficult tests to be admitted into the family as it was before.” One of the tests was to peel the potato called ‘Llunchuguaguachina’ which has lots of eyes and is difficult to peel, or to grind maize mixed with grease on the grinding stone.

The surveyed families belong to four communities, two of them located in the Quechua agro-ecological zone and two in the Jalca zone. Two families live near the city while the hamlets of the other two are quite far away and therefore more traditional.

To whom do the seeds belong?

“Men gather the seeds in the family plot and bring them home, so the women can sort and arrange them as they wish...”

“They belong to us, to us the women”

“To whom else can they belong, than to us women”

“It’s women’s work”

The close relation between woman and seed was made evident in the seed fair held at Chetilla in 1992, the purpose of which was to identify the farmers with the biggest number of native seeds. Chetilla is a very traditional community of Cajamarca and numerous women brought their seeds. The few men having the misfortune to show up at the contest had to retreat because women called them *walmishco*, which means feminine, and reprehended them saying “if you want to be here, why did you not bring your wife?”, and “seeds belong to women.” Men did not respond to the reproaches, but they had a rather ashamed look and knew that the women were right.

This incident may be explained by strong Andean tradition, where the division of work roles is well defined and everything referring to the

conservation and care of the seeds belongs to women. When a group of people or individuals is asked to whom seeds belong, women, husbands and children will respond “to the women”; never would anyone say that they belong to men. It has nothing to do with property, but is a gender responsibility of the women within traditional division of labour and farmers’ belief.

Another situation told by the husband of a women farmer illustrates this point: the technician of a development project had reprimanded him because he had not returned all the seeds borrowed from a revolving fund. He had answered with the categorical argument that he (the technician) should have claimed the seeds before they were taken home, because now being in the house, they no longer belonged to him. “How can I take the seeds once they are in the house, this can never be done, even when the Engineer got annoyed it was not possible to take the seeds.”

What is the woman’s duty to the seeds?

As long as seeds remain in the family plot, men are responsible for cropping, harvesting and transportation. The woman’s responsibility starts when the products enter the home. “When the men give them to us, we will start to care for them, to separate them, to manage them as we please; men have nothing to do with it.” “That’s why every farmer’s wife has to know how to separate and manage.”

Women are very communicative about this point and they are convinced that caring for and selecting the seeds are strictly feminine duties. Older women, which means grandmothers and mothers-in-law, are outspoken about it and readily explain with the help of their fingers the practice of the three and the five of seeds. With some malice they add: “The woman has to know this, if she doesn’t know, how will she manage the food for her children? Or maybe she is a good-for-nothing, that’s bad for her husband. But you can’t tell (before), if she doesn’t know, she will have to learn with the help of beatings, why didn’t they show her as a child in her home?”

The feeling about the relationship between women and seed is clear within the tradition of Andean thinking, which is embedded in a dual conceptualization of reality: it is duality defined by the principles of masculinity and femininity.

Within this same peasant tradition, the man’s semen is also called “seed”. The similarity established by this thinking is very interesting: the man’s “seed” is deposited in the mother’s womb, and the plant seed grown in the plot is harvested and then deposited at home. Similarly, storage at home is like the mother’s womb, where the man entrusts the seed to the woman.

In Andean thinking, the man deposits the seeds and the woman receives them, either in her womb or in the attic of her home, to keep and to nurse them. They are her responsibility until they leave her dominion and go out, back to the world or to the family plot.

Selection: the three and the five

Basic knowledge and skills that every woman should have begin by knowing how to use criteria for “separation”, “management”, “*acrashay*”, “putting together and piling”. These are the different expressions referring to the classification criteria for harvesting products and dividing them into piles according to family necessities.

“... we know that the five is for maize and the three for potato”.

“Five belongs to maize: first is for seed, second for *mote* (boiled maize), third for *cancha* (roasted maize), fourth for *chochoca* (boiled and ground maize) and the last for *jora* (maize beer).”

“For the potato it’s three: first is for seed, second for food and the small ones are to make *papa seca* (dried potato).”

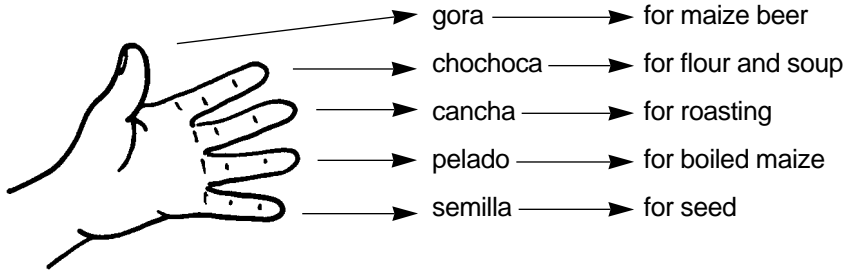
However, some women from nearby communities recognize “the four and the two”. It seems that the number of criteria may be related to the variety and types of crops prevailing in each community. For instance, in the agro-ecological zone Jalca where potato production dominates, a larger number will be used for the classification of the tubers, while the opposite is true in a community of the Quechua zone with mainly maize production.



Maize selection

This is the way Doña Meshe concludes her knowledge of maize selection:

“Five qualities for maize, said my mother. The first is for seed, the second for peeling, next for *cancha*, next for *chochoca* and the last one for *jora*.”



Another farmer woman, Doña Maria explains:

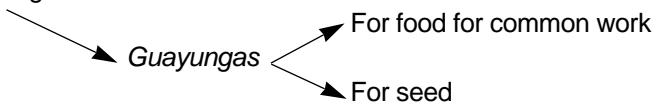
“First we have to choose the biggest and best ears for the *guayunga*. To let them dry, we open the husks with the *tipina* (a sharp and pointed instrument). We make *guayunga* only with the big and good ones, we tie together the husks of two ears and hang them in the *altillo* (open attic) of the house. We cook them to feed all the people who help in the *minga* (common agricultural labours).

For the seeds we keep them in *guayunga* too; when we shell the maize, we keep the bigger kernels for seed and the smaller ones are for food.

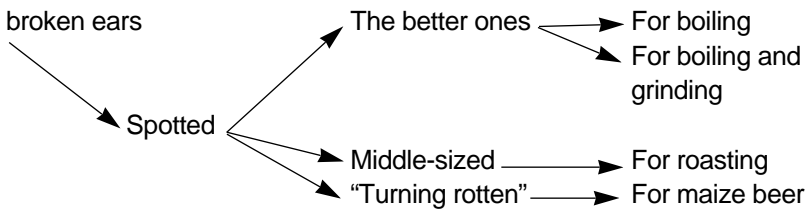
The small cobs are kept in the open attic, sometimes we just pile them on the small balcony outside the attic. If we have a lot, we do better to shell them and keep the grains in *costales* (big home-made llama fibre bags). From there we separate the bigger ones for *chochoca* and *mote*. The small ones are used for roasting and with the spotted, half-rotten ones we make maize beer, for the field work.

The criteria for maize selection are:

1. Big and good ears



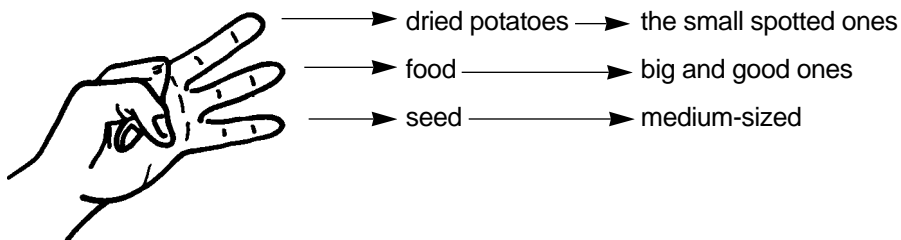
2. Small broken ears



Potato selection

This is Doña Meshe's manner of selecting potatoes:

"First, one has to sort the tubers damaged in the harvest, these we cook promptly, as well as the ones with spots or worms (Andean potato weevil). From the good ones, we choose the biggest, they are for food. The middle-sized ones are for seed and the rest, the smallest, spotted and diseased ones we cook and peel to let them dry for dried potatoes."



"Potato seed has to be very nice and very healthy. Therefore we take care that it is:

Free of blight and diseases

Without damage from worms or nematodes

And without damage or cuts from the harvest."

Olluco selection:

"We separate the green, healthy, middle size ones and let them become greener. The big ones go for soup and the small ones we eat boiled."

Oca selection:

"First the middle sized, but clean, healthy ones. If they are spotted or with blight, they will soon rot."

Second: The big ones, for soup.

Third: The small ones, to boil."

Doña Florinda, whose family plots are in the Jalca agro-ecological zone where potato crops prevail, learned from her mother the techniques of selection:

"First you have to separate the rotten potatoes, otherwise they will corrupt the rest, said my mother. Then we separate for the seed the good and middle size ones. Not the small ones, because their sprout would be very thin, she said."

"The seed is the most essential, said my mother. When there was none, we stopped eating (potatoes). When there was no seed, we cut the big potatoes into three pieces, but watching the eyes, each piece had to have an eye. After that, we rubbed on some ashes to dry the cut surface."

Traditional storage practices

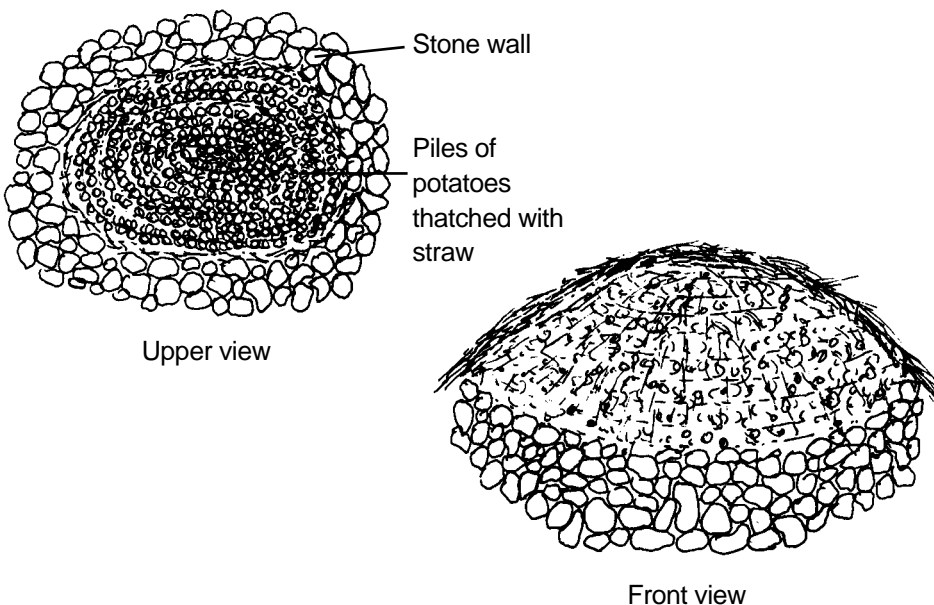
Potato storage

Says Doña Meshe:

“... we make the selection, after that the seeds have to be exposed to the sun, for one day. Then, we pile them in the room, facing the door. First we spread eucalyptus leaves around and above them, to turn the potatoes green. When they turn green, they are bitter and nothing will attack them, not even the worms. Then we spread eucalyptus leaves again in the corners (of the room), to form the bed of each (variety of) seed, in piles. When blight appeared, my mother said: now it has appeared, we have to take the potatoes out to the sun, then select them and put apart the ones with blight.

Beforehand, my father had a good harvest, so he buried the big potatoes, he made a hole, covered the soil with wallte (*Festuca dolichophylla*), put the potatoes in, covered again with wallte and finally with earth. He buried only the potato for food, not the seeds, these were kept in the room. In August he would take them out, they were very fresh, as if they had just been harvested.”

“First, the good big potatoes are separated and they are kept to eat little by little. The spotted and cut ones are to be eaten soon, before they get totally rotten. We keep the good potatoes in a corner of our house, piled up. If there are many, we cover them with straw, but if there are few, they are soon eaten” says Doña Maria.



Corralito and pirca

Says Doña Florinda: "We harvested and selected each (variety of) seed separately. Grandmother said: outside you pile it up and make a *corralito*, then you thatch it with straw. The *corralito* we made in small earth mounds, with stone walls around. On the soil we put straw, then the potatoes and again straw. Rainwater could not get through. When planting time came, the potatoes had already sprouted.

When there was a *poyo* nearby (big earth mound) we made holes, not straight down, but to the inside (like small tunnels). We would cover the soil with repellent plants called *tumbisha* and *marco* (*Ambrosia peruviana*), so the worms wouldn't get in, and finally we closed the entrance with straw and earth, this was the *pirca*. We didn't put stones on, because they cool the seeds." ("To cool" means to lose the capacity to sprout.)

"Previously, in the Jalca zone we had a house with a thatched roof, in the open attic the seed was all right. But today in a house with a tin roof, the seed dries out quickly because the tin roof heats too much." (Doña Margarita).

Maize storage

"To store the maize, we dry it as *qaspa* (ears covered with their husks) and spread it on the floor of the open attic. Only when they are well dried do we shell them, because if the ears are recently harvested and the kernels are humid, the germ will break and it will not grow. Once the ears are shelled we keep the grains in big storage bags in the open attic until the sowing. The rest of the grains are to eat, and the ones we use for roasting, we keep in earthen pots." (Doña Meshe).

"Formerly there were no moths; now they finish off the food, we can't keep it any more. Only the maize peeled with ashes isn't attacked; we also "burn" the maize in boiling water, then we put it in the sun so we can store it." (Doña Maria).

Storage of oca and olluco

"We pile the oca in the open attic and when they sprout we tear off the eyes (sprouts) and they grow nicely. Olluco too we pile in the open attic, like potatoes." (Doña Florinda).

Storage of the Andean grains quinoa and amaranth

"Seeds (of grains) we keep separately in an earthen pot, neither rats nor anything else will eat them. We keep the pot on the floor in the open attic and we cover it with an earthen plate." (Doña Margarita).

"My mother said, the food, the grains should be taken out in the morning, not in the afternoon or at night because the seeds are alive, they are resting." (Doña Meshe).

Each variety has its use

When deciding about keeping or favouring a special crop variety¹, women will take into account not only the yield, but also the consistency and flavour of the tubers. Usually, by using the term “seed”, women mean the amount required to be reproduced in one family plot. When they speak in the past and say “it used to grow well, it was big” they refer to the fact that this particular variety has lost its ability to produce sufficient seed for a plot, for diverse reasons or calamities. But small amounts of them will still be grown.

Doña Meshe: her family plots are located in the Quechua agro-ecological zone

Name	Description, use
Potato	
Kukuli	Big, used to yield a lot. Another small one, was flat.
Wagalina	Big, looks like ojota (sandal made of used tire). Another small one
Sapa	Black Greyish, nearly white. Used to grow well, was big.
Segobia	Was very good, very big.
Huachua	Black Another reddish one with a white ribbon. It yielded, yes it produced well.
Liberteña	The common potato was lost. We used to plant it, it just becomes lost, it gets pests and diseases and produces nothing more.
Oca	
Colorada	Red
Blanca	White
Barbilla	
Wangashanga	It was the queen of the ocas, it was like a potato for preparing spicy dishes.
Limeña	
Viuda	Widow
Señorita	Young woman
Wirguiana	
Luisa	

1 Editor's note: A “variety” in the Andean context is defined by its use, rather than by its phenotype.

Doña Maria: her family plots are located in the lower Quechua agro-ecological zone

Name	Description, use
------	------------------

Potato

Poropurina	It was a common seed.
Manzanita	(Little apple). Round, without eyes.
Limeña	Starchy with big eyes.
Wayro	Was nice, yielded well.

Maize

Misha	Is spotted, with streaks.
Negrilo	(Black). Appears to be blue.
Mullo	Spotted, looks pink.
Lotecito	For roasting. Its colour makes it look rotten.
Morocho	For making flour, for soup. It was lost, because it didn't rain for 2 years.

Paqcho

Cullamaiz	Very tasty, it bursts when roasting.
Barboncito	Yellow, soft for roasting.
Cashashillo	The point of the kernel is like a thorn, it hurts when we shell it.
Yawarsara	Blood coloured, for roasting
Shingosara	Blackish, for making purple-coloured maize beer.
Imperial blanco	(White imperial). For boiling.

Doña Florinda: her family plots are located in the Jalca agro-ecological zone

Name	Description, use
------	------------------

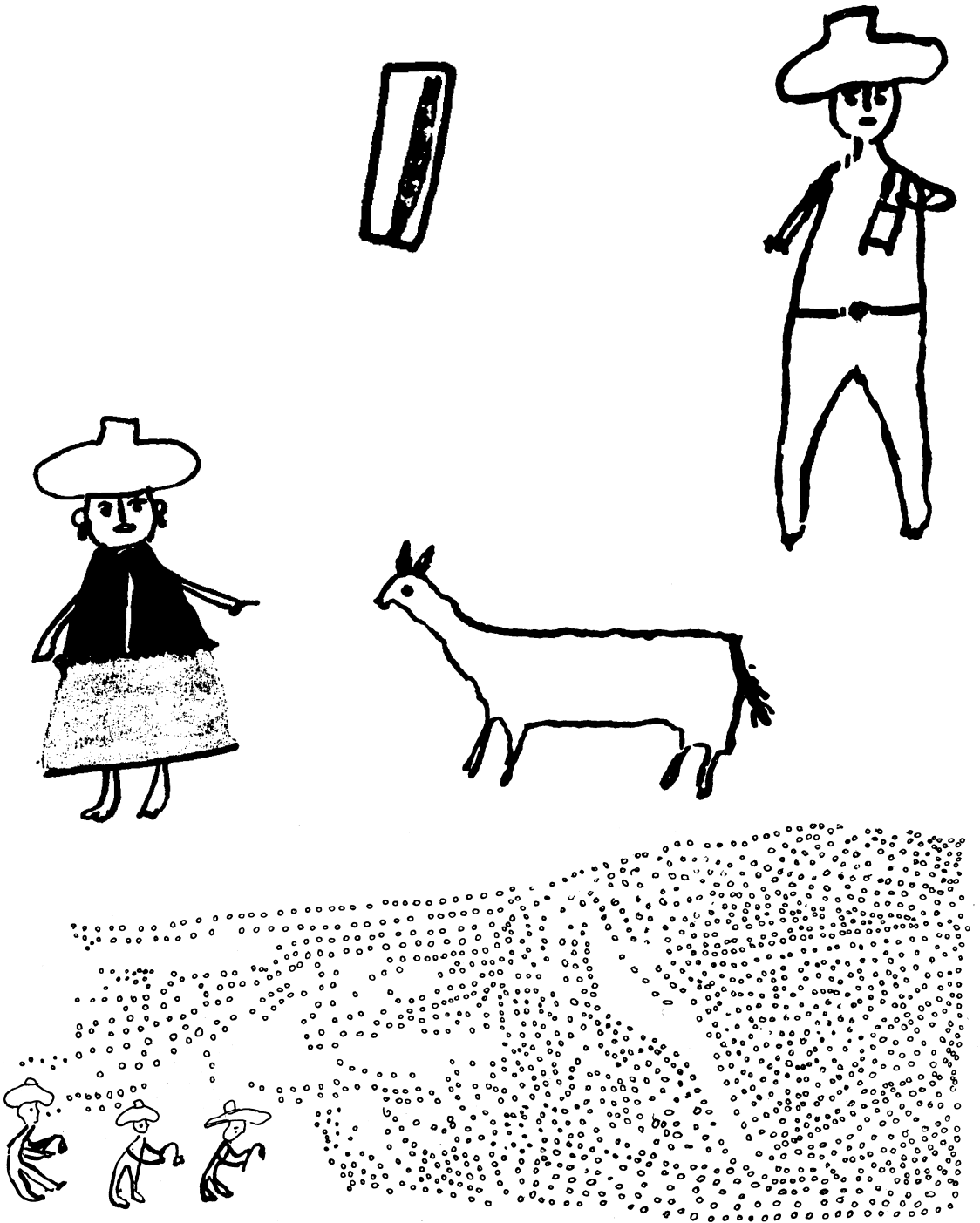
Potato

Sapa	White, big, they were very watery. Another small white one. Another black one, it was also called 'Condorilla'. Another spotted one.
Yuquilla	Big, was long. Another small, spotted one.
Wakrar	Spotted.
Bonita	Chiquibonita (Small and pretty), spotted, red, narrow. Grandebonita (Big and pretty), narrow, all red.

Name	Description, use
Shimbina	Red with many big eyes. Another small, red one, with big eyes.
Alisa maway	Early seed, reddish.
Troga	Red, middle sized. Another white one.
Wachua	Reynaldo (a neighbour) planted it, then Turaq (another neighbour) took two potatoes from his plot and gave them to my husband.
Clavelilla	Black, is good sized. Another red one. Another yellow one.
Cashpada	The flesh is yellow. Is tasty when cooked and opens like a rose.
Limeña	
Wagalina	Big, yellow. It's a first (class) potato. Another small, spotted one. One is white and another is red. Chaucha Wagalina, grows quickly.
Avellana	Small, flattened, like <i>ojota</i> (sandal). Another big one.
Carnera	Big, greyish, long.
Jardinera	Black, with yellow flesh.
Celendina	Blackish.
Lengua de vaca	(Cow's tongue) Small, white. Big, yellow.
Kukuli	(Pigeon). Small, white, the centre is purple. Another big one.
Mishunga	White. Black skin, the flesh is yellow.
Congora	It's just eyes. We can't sell it, it's just eyes. White, big.
Montanera	Small, red. Has the colour of 'Liberteña' Another big one.
Wayra	Yellow and white. Nice and tasty potato.
Pagachoga	Yields a lot, but is not big; suitable for making dried potato.
Chaucha	Purplish-red, long, with yellow flesh. Another round, yellow one. Black, early, grows in four months. Purple Yellow-cream Greyish

Doña Margarita: her family plots are located in the Quechua and Jalca agro-ecological zones

Name	Description, use
Potato	
Lola	White, has a good yield. Another, purple one.
Chupiquita	
Mariva	Purple and white, it's a new potato (introduced).
Curao	There was a lot, it became lost.
Wayro	"Nice girl", is quite big. Another with streaks, orange-coloured, long.
Capiro	
Yungay	
Azulga	Big or small. Greyish skin, the flesh is blue, starchy.
Apalinaptranqa	Long, pointed, partly black.
Conda	Ovate, looks similar to 'Perrichola' (another introduced variety).
Shingopcanilla	Long, black.
Llunchuguaguachina	Long, ovate, black.
Maway	White. Some call it Emilia. Has little yield.
Wakapcatium	Ovate, nearly flat. Looks almost like 'Wagalina', but is bigger, red and with white eyes.
Troga	One is ovate. Another is nearly flat. It used to yield a lot, now it's lost.
Indio maway	Looks like 'Maway' but the skin is red.
Wakwacra	Black, there are some white ones too. Is starchy, very good.
Oca	
Pimpin	A more greyish one. Another more white, with big eyes.
Shaywa	
Chupica	Poor yield.
Chaucha	White.
Carwita	Starchy.
Mishobispan	
Yanita	Black.
Olluco	
Amarillo	(Yellow), poor yield.
Blanco	(White), poor yield.
Shillas puntitas	
Rosado	(Pink).
Carwita	



Ana Maria Herrera explains on this drawing the labour of a seed-breeding woman: her son has brought the seeds; men are preparing the soil (notice their relative size) and she commands, with extended arm and index finger, where the planting should be done.

How are the skills and knowledge acquired?

In addition to performing a special role in the production process, it is women's duty to carry out the transmission of knowledge to new generations, securing in this way the continuity of technological traditions, which are essential for the survival of the farming family. It is interesting to know the ways in which women learn about seed selection, distribution and storage or care and also to see if they actually teach all this to their daughters.

Once more it can be confirmed that learning is practised by "observing and doing". The grandmothers, mothers and girls remember learning how to choose, separate and care for the seeds by "helping my mother, early in the morning, while cooking the soup."

Or the elder women tell: "we helped her to sort the potatoes, maize, oca, olluco, all the food." "This spotted maize may get rotten, it's for maize beer, said my mother; and we do it the same way."

The girls like to show how much they have learned in this apprenticeship and help to explain some words used in the native Quechua language. "When I was five or six years old, already we helped our mother to separate and choose the seeds."

"Helping my mother, I learned to sort, when I was a small girl. She would call us to help her, saying this is the way to choose, so we helped her because she could not do it alone. We had to get up early, to sort the seeds, until we had finished." (Doña Meshe).



The author Ana De la Torre with peasant girls. Behind can be seen an attic with maize *guayungas* hanging to dry.

Opinions about modern seed storage

The seeds, once harvested, need care to conserve their germinating capacity and to avoid damage due to insects and rodents. Modern techniques of storage use indirect light for tubers; however, dark and dry rooms are more suitable for grains.

In the last few years, several development projects have built communal storehouses to keep potato seeds. Women have different opinions about them:

“Mice have entered and have eaten our seeds. In these storehouses we don’t manage ourselves, it’s no longer the charge of each one of us. They even put the seeds without having spread them in the sun, we put them well in the sun before storing. Just see how the men receive and jail the poor little seeds. It is much better to keep each one in his room, we take better care of it, of course one knows his seeds and honours them.....” (Doña Meshe).

“They are better off in our houses, in the open attic, so that each one can care for them, because sometimes they don’t produce. There are drugs too for the seeds, because these days there are many pests. Our heads ache badly when we take out these potatoes, we even get nausea, it’s surely from these drugs they put on them.....” (Doña Florinda).

Her husband adds: “We don’t use drugs yet in our storage. They wanted to make us wash (treat with drugs) the seeds, we didn’t accept that. We stored them just like this, how would we wash them, besides, the seeds get cooled”.

The opinion of the women was that seeds should be stored and managed by each household. There are likely to be important advantages for the conservation of diversity in decentralizing decisions on seed selection, management and storage to individual households.

Conserving diversity contributes to food security

“Many seeds get lost, but you can still find the plants, they remain; they just don’t yield as they used to do”

To obtain food security for a family means to ensure the satisfaction of its nutritional needs in sufficient quantity and quality. The three key elements for this security are: access, availability and good use of the foods.

The access and availability depend on technological and economic factors such as the improvement of production characteristics, the possibilities of seed renewal, the obtaining of new varieties, the nutritious and culinary qualities, as well as post-harvest processing and transformation facilities. Researchers and plant breeders work to enhance and improve the genetic bases of cultivated plants and therefore they also appeal to local varieties. These, and the wild relatives, constitute the reserve of genetic resources which allows human species to have enough food for survival.

The conservation of biodiversity very much depends on maintaining the production of native species. The growth in food imports and the consumption of foods unadapted to the ecological conditions and food



A thick soup called *chairo* is made with black chuño.

habits of Andean people is increasingly evident, and displaces the production and consumption of traditional staple crops.

Good use of the foods is another of the tasks which belong to women farmers. Although in many poor homes the women demonstrate their capacity for optimizing the use of their resources by means of traditional practices, this good use of native foods is being lost. The habit of consuming foreign foods with low nutritional contents is increasing. This habit is very difficult to reverse and will affect the nutritional status of the most vulnerable groups.

Therefore, nutrition education is an important strategic element in any programme that has the goal of reinforcing and/or obtaining food security. Equally, training for a better and increased use of native crops has an impact on the recovery of Andean agriculture. It supports the task of obtaining appropriate nutrition and foments the use of a wide variety of nutritious species, which contributes to biodiversity conservation.

When selecting the seeds, the rural woman not only considers the colour, characteristics and size of crop yield: she also identifies the flavour and texture of each product. This is to ensure the continuity of traditional nutrition: she prepares daily the steaming *mote* (boiled maize), toasted grains and pulses and parboiled tubers, not to mention the nutritionally rich combinations of ingredients in soups and stews. On festive occasions she will add the tasty *tamales*, white *morayas* and foamy *chichas* (maize beer).

The growing invasion of introduced foods in rural areas is doubly worrying: not only does it endanger the continuity of traditional food habits, but it may also result in the loss of interest in conserving biodiversity.

Rural women should receive information about the importance of this and above all get the support to maintain the diversity of products in their family plots: they need the training to be able to offer varied and nutritious food to their families and at the same time they should see their efforts being reflected in an economic advantage.

The examples of culinary preparations shown here are based on the use of Andean native crops in two different agro-ecological zones.

Suni zone: chairo soup made with black chuño, potatoes and faba beans

Ingredients for 6 servings			Preparation
Dried and salted meat	120 g	One big piece	<p>The previous night put to soak the chuño and change the water several times. Also soak the peeled whole wheat and maize. Next day, put the washed dry meat, wheat and maize to boil in water, with garlic and chopped onion for 1 hour; add salt. Add the carrots and potatoes cut in fine strips, let boil for 15 minutes. Peel the chuño and grind it coarsely. Add to the soup, together with the peeled faba beans and the ground chili. Let boil until it has a quite thick consistency. Serve with chopped parsley.</p>
Potatoes	600 g	6 potatoes	
Black chuño	200 g	16 chuño	
Whole wheat, peeled and soaked	160 g	6 tablespoons	
Maize, peeled and soaked	200 g	1 cup	
Carrot	200 g	2 carrots	
Faba bean, green	200 g	1 cup	
Onion, whole	160 g	2 middle sized	
Red chili, garlic, and chopped parsley			

Quechua zone: tamale made with maize and tarwi (*Lupinus mutabilis*)

Ingredients for 10 tamales			Preparation
Peeled and cooked maize (chochoca)	120 g	3 cups	<p>The previous night, soak the chochoca maize. Grind the maize on a grinding stone or a grain mill, also grind the peeled tarwi. (Tarwi needs a pre-soaking process to wash out the bitter alkaloids). Add the grease, milk, salt, sugar and anise. Beat at least half an hour with a big wooden spoon. For preparing the stuffing fry the chopped onion, garlic and ground chili in hot oil. Add the pig meat, which is cut in medium-sized pieces and fry. Then add salt and oregano. The tamales are prepared in maize husks or achira leaves (<i>Canna edulis</i>). Pieces of boiled egg, strips of yellow chili and black olives can be added to the stuffing of each tamale. Then arrange a bed made with husks in a big pan, cover this layer with water, arrange the tamales on top and steam for about 20 minutes.</p>
Pig grease or any other	150 g	5 tablespoons	
Tarwi, processed and peeled	250 g	1 heaped cup	
Milk		Half a cup	
Salt, sugar and anise		To taste	
Stuffing			
Pig's meat, red and yellow chili, garlic, chopped onion			
Oil, salt, oregano, boiled egg and black olives.			

Women and seed conservation in Agenda 21

Until very recently the woman's role as a conservationist, user of genetic diversity and agent of natural resources was largely ignored. Nowadays, it is increasingly recognized that the pursuit of conservation and the sustainable use of biological diversity would be impossible without women's participation in decision-making and in the control over natural resource production and administration (FAO 1993). Equally, it is recognized that the transmission of knowledge and practices related to seed selection to future generations is dependent on the daily, persevering and silent activity carried out by women farmers.

These topics were part of the matters of discussion at the United Nations Conference on Environment and Development, better known as the "Earth Summit" held in 1992 in Rio, Brazil. A global plan of action – called Agenda 21 because it should extend into the next century - was adopted. This historic document of 700 pages represents the consensus reached by 179 States in Rio and is a blueprint on how to make development socially, economically and environmentally sustainable and a call to mobilize additional finances and technology required to support the actions. Some of the points related to women and biodiversity are as follows.

About conservation of biological diversity

Many indigenous and local communities have a close dependence on biological resources and nations should make use of this traditional knowledge of the conservation and sustainable use of biological diversity. Countries are to preserve and maintain such indigenous and local knowledge and promote its wider use. This is to be done with the approval and involvement of those who have such knowledge and these people should benefit from the use of their practices.

The Conference recommends taking the necessary measures, according to national legislation, to respect, register, protect and broadly adapt the knowledge, innovations and practices which constitute the traditional way of life of the indigenous and local groups. Also necessary is to allow the conservation of biodiversity and the sustainable use of the biosphere with the purpose of a fair and equitable distribution of resulting benefits, and to promote means of allowing the participation of these collectives, including women, in conservation and administration of the ecosystems.

In favour of woman's participation in a sustainable and equal development

Women have considerable knowledge and experience in managing and conserving natural resources. However, the role of women in achieving sustainable development has been limited by such barriers as discrimination and lack of access to schooling, land and equal employment.

Countries should create databases, as well as information systems, based on women's experience and knowledge regarding the administration and conservation of natural resources. United Nations organizations, other international organizations of development and financing, as well as governments should take the appropriate measures to integrate the values, concepts and knowledge of rural women in policies and programmes related to the administration of natural resources and should pay attention to the reinforcement of the role of rural women.

Advances and future possibilities

Native seed conservation is weakening and in danger of becoming lost because of the influence of the market where few and selected varieties are preferred, and because of rural migration and even climatic factors.

In the face of these facts different strategies are possible. An action which allows not only the registration of biodiversity, but also stimulates women's work of conservation and the selection of new varieties, is the organization of seed fairs, events in which the maintenance of peasant varieties is encouraged. However, in these fairs, for diverse cultural reasons, the men may represent the family and undermine women's participation. For this reason the active and direct participation of women should be insisted on. There should be one or several conservationist women among the members of the examining jury at the seed fair.

Another appropriate alternative could be to organize women's workshops to encourage them to exchange their experience of plant genetic resources and in this way promote training that values the local concepts of seed selection, seed preparation and use according to the characteristics of the native Andean crops. Women's knowledge in matters of traditional technology and their ancestral wisdom should not be excluded by formal science.

The development of women's creative capacities, skills and abilities can include traditional methods of competition, called *atipanakuy* in the Quechua language, which means to compete (CIDRA-CEDAP 1996). This can include gastronomic festivals where the use of native crops is reflected in the variety of local dishes prepared for a culinary contest.

The promising proposal of a Peruvian NGO consists of supporting the organization of women's work based on a native crop, such as the selection and production of purple maize with a conservationist approach (TADEPA 1996). Purple maize is very popular in the Central Andes for preparing sweet dishes and maize beer, both fermented and unfermented.

The Peruvian National Programme of Watershed Management and Soil Conservation (PRONAMACHCS), promotes through its Rural Woman's Unit the exchange of experiences among rural women, involving the preparation and selection of Andean crop seeds, with the perspective of a sustainable use of natural resources. In recent years it has been possible to increase the participation of rural woman not only in technical training, but also as decision-making members of soil conservation organizations.

The Network of Technical Cooperation of Institutions and/or Organisms of Support to Rural Woman acts under the patronage of FAO and the Peruvian Ministry of Agriculture as an instrument to summon Government Institutions, Non-Governmental and International Organizations which are working to rescue and value rural women as social and productive agents.

In this way alternatives and institutional frameworks exist which would allow the intensification of concrete actions in response to the directions of the famous Agenda 21 of the Rio Conference about Environment and Development. It is important to highlight the opinion expressed in this document that "groups should have the possibility to obtain a profit of the economic and commercial advantages which emanate from the use of their methods and traditional knowledge" and that "there should be a fair distribution of the resulting benefits." This evidently implies a new focus which needs to be reconciled with "patent" or "free market" transactions of plant genetic resources.

The intention is above all to promote ecological agriculture, with sustainable methods which contribute to the preservation of biodiversity and value; in this case the rural woman's knowledge of seed selection and conservation. In addition, the ancestral contributions of communities should be recognized and the possibility of participating in the management and administration of these resources should be given to women, so that they can become agents of change rather than "beneficiaries".

Bibliography

- Altieri, M.A. and L.C. Merrick. 1987. *In situ* conservation of crop genetic resources through maintenance of traditional farming systems. *Economic Botany* 41:86.
- Brush, S.B. y J.E. Taylor. 1992. Diversidad biológica en el cultivo de la papa. *En: La chacra de papa. Economía y Ecología.* CEPES, Lima, Perú.
- Brush, S.B., H. Carney and Z. Huaman. 1981. Dynamics of Andean Potato Agriculture. *Economic Botany* 35 (1) 70-88.
- Cardenas, Martin. 1989. Manual de plantas económicas de Bolivia. Segunda edición. Editorial Los Amigos del Libro, La Paz y Cochabamba, Bolivia.
- Christiansen, Jorge. 1977. The utilization of bitter potatoes to improve food production in the high altitude of the tropics. Thesis, Cornell University.
- CIDRA-CEDAP. 1996. Del trabajo con mujeres al enfoque de género. Segunda Conferencia Nacional de ONG's, Ayacucho, Perú.
- De la Torre, Ana y Sergio Cuzco. 1989. La semilla en la chacra campesina. *En: Manejo campesino de semillas en los Andes.* PPEA-PRATEC, Lima, Perú.
- De la Torre, Ana. 1988. *En: Recursos Naturales y Desarrollo.* INP-PPEA (PNUMA), Editorial Horizonte, Lima, 1989.
- FAO. 1992. Manual sobre Utilización de los Cultivos Andinos Subexplotados en la Alimentación. Oficina Regional de la FAO para América Latina y el Caribe, Santiago de Chile.
- FAO. 1993. La diversidad de la naturaleza: un patrimonio valioso. Día Mundial de la Alimentación. FAO, Roma.
- Hawkes, Jack G. 1983. *The Diversity of Crop Plants.* Harvard University Press, Cambridge, Massachusetts.
- IBPGR. 1991. Thanks to 'Mama Pacha'. *In: Geneflow.* Publication about the Earth's plant genetic resources. Rome.
- Leon, Jorge. 1964. Plantas Alimenticias Andinas. Boletín Técnico #6. IICA, Lima. Perú.
- Manrique, Antonio. 1991. El maíz en el Perú. Fondo del Libro, Banco Agrario, Lima, Perú.
- National Research Council. 1989. Lost Crops of the Incas. Little Known Plants of the Andes with promise for worldwide cultivation. National Academy Press, Washington DC.
- PRATEC-PPEA. 1991. Vigorización de la chacra andina. Cajamarca, Perú.
- Rea, Julio. 1988. Investigación en los Andes. *En: Primer Seminario-Taller Altiplánico de Revaloración del Conocimiento andino.* PAC-MACA-CEPIA-SEMTA, Oruro, Bolivia.
- Rostworowski de Diez Canseco, María. 1988. Estructuras Andinas del Poder. Ideología religiosa y política. 3 edn. Instituto de Estudios Peruanos, Lima, Perú.
- TADEPA, Taller de Promoción Andina. 1996. Promoción de la Mujer campesina. Segunda Conferencia Nacional de ONG's, Ayacucho, Perú.
- Tapia, M. and A. Rosas. 1992. Seed Fairs in the Andes. A traditional strategy for *in situ* conservation of phytogenetic resources. *In: Seminar on Local knowledge and agricultural research.* WAU-ENDA-SGN-GRAIN, Zimbabwe.
- Tapia, Mario *et al.* 1979. Quinoa y Kañiwa, Cultivos Andinos. Serie Libros y Materiales educativos, IICA-CIID, Bogotá, Colombia.
- Tapia, Mario. 1990. Cultivos Andinos subexplotados y su aporte a la alimentación. FAO, Oficina Regional, Santiago de Chile.

- Tapia, Mario. 1991. Sistemas de producción de papa amarga. *En: La Papa Amarga, I. Mesa Redonda: Perú-Bolivia.* ORSTOM, La Paz, Bolivia.
- Tapia, Mario. 1996. *Ecodesarrollo en los Andes altos.* Fundación Friedrich Ebert, Lima, Perú.
- Yacovleff, E. y F. Herrera. 1934. El mundo vegetal de los antiguos peruanos. *Revista del Museo Nacional, Tomo III N° 3,* Lima, Perú.
-