Traditional Agriculture and Indigenous Knowledge - Section 1
New Direction in
Agricultural Research
Why Study Traditional Agriculture?

Old Models Deserve Review

Until very recently, agricultural development programs to modernize traditional food production systems have generally prescribed purely technological solutions to problems which are also environmental, cultural, social, and economic in nature. The tragic consequence has too often been a mismatch of development objectives to the needs and potentials of local people. To remedy and avoid such tragedy, some basic features of traditional agriculture like risk-bearing capacity, biological folk taxonomies, and symbiotic crop mixtures merit study and understanding by development planners. Information gathered from the study of traditional agriculture is useful for developing appropriate strategies that are sensitive to agroecological complexities, socioeconomic processes, and local peoples’ specific needs.

A second reason to study traditional agriculture is to apply ecological principles to the design of improved food production systems in industrial nations. Practical application of traditional agricultural knowledge could help correct deficiencies that affect modern agriculture. Many such deficiencies are related to the substitution of high energy inputs for local biological and cultural resources. The experiences of farmers in traditional systems over centuries of food production without external inputs, capital, or scientific knowledge has guided the development of sustainable agroecosystems managed with locally available resources and human and animal energy in many parts of the world.

The cultivation of diverse crops in time and space allows farmers to maximize their security of harvest using minimal inputs and low levels of technology. Many agroecologists thus view traditional systems as unique opportunities to evaluate the properties of stability and sustainability and to obtain ideas about alternative design and management of agroecosystems.

Knowing the Neighborhood

In the study of any traditional or modern agricultural system, production should not be analyzed separately from the human culture that nurtures the system. But food production systems are complex, and people's knowledge base for managing them can be very sophisticated. Traditional knowledge systems are built and modified with information derived from the interaction of people with their environment. When people interact with their environment, the most adaptive information for a particular function is selected for use. The most successful adaptations are preserved and passed from generation to generation through verbal or experiential means.

Recent research on this process suggests that the discrimination of information obtained from environmental perception is most pronounced in communities living where there is great physical and biological diversity, and/or in communities where the margins of survival are most acute. Older members of communities are known to possess greater and more detailed knowledge than younger members. Soil types, soil fertility status, and land use categories are often discriminated in detail by practitioners of traditional knowledge systems. Soil types may be distinguished by color, texture, consistence, organic matter content, vegetative cover, and even taste and smell in some cases. In addition to soil taxonomies, many complex systems of traditional knowledge about plants and animals have been studied and documented worldwide. In general, researchers have found that a good correlation exists between traditional and scientific taxonomies.

Life is Not Simple

Traditional farming systems often feature a considerable degree of plant diversity in the form of polycultures and agroforestry patterns. Complex ethnobotanical taxonomies commonly guide practitioners' identification and use of the vegetation within their system. Because traditional agroecosystems are also genetically diverse, partial resistance to diseases by particular crop varieties is not uncommon. This genetic diversity allows farmers to plant crop varieties adapted to the site but resistant to a specific disease, in microclimates where conditions exist for the disease to flourish. The ability to assign taxonomic nomenclature to the site, to the
disease, and to the resistant crop variety is a useful management tool, especially with regard to enhancing harvest security.

In much of the developing world, farmers face enormous production problems associated with steep landscapes, floods, droughts, pests and disease, and low soil fertility. Yet many farmers using traditional techniques apply unique management principles to overcome or minimize these constraints. These principles include:

- Maintenance of a spatial and temporal diversity of crops and vegetal cover.
- Optimum utilization by crop mixtures of space and environmental resources.
- Recycling of nutrients.
- Water conservation and management.
- Control of succession and provision of crop protection against pests.

Traditional systems within which these management principles are applied are often characterized by high species numbers, exploitation of diverse microenvironments within a field or region, biological pest suppression, significant use of human and animal energy, reliance upon local crop varieties, and use of wild plants and animals for consumption purposes.

Where to Begin

The study of traditional agroecosystems can accelerate the emergence and acceptance of agroecological principles for the development of sustainable agroecosystems throughout the world. All people concerned with the problems of rural poverty and world hunger, farmers and scientists alike, need models of sustainable agriculture that combine elements of traditional and modern knowledge. Structural changes in world agricultural economics are required for adoption of such a development model. Above all, governments must recognize rural peoples' knowledge as a major natural resource.

Miguel A. Altieri (from Agroecology, 1990)
Indigenous Knowledge

1. Focus on the practices and knowledge of farmers themselves

Indigenous knowledge is:

- The systematic body of knowledge acquired by local people through the accumulation of experiences, informal experiments, and intimate understanding of the local environment.

- The skills and knowledge of local people derived from many years of experience and usually communicated orally through family members across generations.

2. Involving farmers in the research process

- “Farmer First”, or participatory research
1. Focus on indigenous knowledge
   - The practices and knowledge of the farmers themselves

2. "Farmer first," or participatory research
   - Involving farmers in the research
## Comparative Nutrition Qualities of Andean Foods

<table>
<thead>
<tr>
<th></th>
<th>Protein (gr/100gr)</th>
<th>Lysine (gr/100gr)</th>
<th>Calcium (mg.)</th>
<th>Niacin (mg.)</th>
<th>Ascorbic acid (mg.)</th>
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<tbody>
<tr>
<td><strong>Cereals</strong></td>
<td></td>
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<td></td>
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<tr>
<td>Quinua</td>
<td>14</td>
<td>0.88</td>
<td>120</td>
<td>1.35</td>
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<td>Kiwicha</td>
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<td>0.80</td>
<td>180</td>
<td></td>
<td></td>
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<tr>
<td>Wheat</td>
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<td>36</td>
<td>2.85</td>
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<tr>
<td>Rice</td>
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<td>40</td>
<td>3.85</td>
<td></td>
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<tr>
<td>Corn</td>
<td>9</td>
<td></td>
<td>14</td>
<td>2.15</td>
<td></td>
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<tr>
<td><strong>Tubers</strong></td>
<td></td>
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<td></td>
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<tr>
<td>Olluco</td>
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<tr>
<td>Oca</td>
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<td></td>
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<tr>
<td>Potatoes</td>
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<td></td>
<td>6</td>
<td>1.85</td>
<td>9.0</td>
</tr>
</tbody>
</table>

### PICOL: CROP ROTATION
One plot in six years

- Year 1: Potato
- Year 2: Andean Tubers
- Year 3: Barley
- Year 4: Fallow
- Year 5: Fallow
- Year 6: Fallow

**Notes:**
- Quinua: Quinoa
- Kiwicha: Kiwicha
- Olluco: Olluco
- Oca: Oca
- Potatoes: Potatoes
- Fallow years are not farming years.
This system is an example of "Mixed Cropping"

- varying crops by altitude
- varying crops on dryland and irrigated land
- different crops in different temperature zones
- different growing season length
- disease and pest resistance (different crops and different varieties of each)