Farmer participatory research on coconut diversity: workshop report on methods and field protocols

Pablo B. Eyzaguirre and Pons Batugal (editors)
Farmer participatory research on coconut diversity: workshop report on methods and field protocols

Pablo B. Eyzaguirre and Pons Batugal (editors)
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’s headquarters is based in Rome, Italy, with offices in another 14 countries worldwide. It operates through three programmes: (1) the Plant Genetic Resources Programme, (2) the CGIAR Genetic Resources Support Programme, and (3) the International Network for the Improvement of Banana and Plantain (INIBAP). The international status of IPGRI is conferred under an Establishment Agreement which, by January 1998, had been signed and ratified by the Governments of Algeria, Australia, Belgium, Benin, Bolivia, Brazil, Burkina Faso, Cameroon, Chile, China, Congo, Costa Rica, Côte d'Ivoire, Cyprus, Czech Republic, Denmark, Ecuador, Egypt, Greece, Guinea, Hungary, India, Indonesia, Iran, Israel, Italy, Jordan, Kenya, Malaysia, Mauritania, Morocco, Pakistan, Panama, Peru, Poland, Portugal, Romania, Russia, Senegal, Slovak Republic, Sudan, Switzerland, Syria, Tunisia, Turkey, Uganda and Ukraine.

Financial support for the Research Agenda of IPGRI is provided by the Governments of Australia, Austria, Belgium, Brazil, Bulgaria, Canada, China, Croatia, Cyprus, Czech Republic, Denmark, Estonia, F.R. Yugoslavia (Serbia and Montenegro), Finland, France, Germany, Greece, Hungary, Iceland, India, Ireland, Israel, Italy, Japan, Republic of Korea, Latvia, Lithuania, Luxembourg, Malta, Mexico, Monaco, the Netherlands, Norway, Pakistan, the Philippines, Poland, Portugal, Romania, Slovak, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, the UK, the USA and by the Asian Development Bank, Common Fund for Commodities, Technical Centre for Agricultural and Rural Cooperation (CTA), European Union, Food and Agriculture Organization of the United Nations (FAO), International Development Research Centre (IDRC), International Fund for Agricultural Development (IFAD), International Association for the promotion of cooperation with scientists from the New Independent States of the former Soviet Union (INTAS), Interamerican Development Bank, United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP) and the World Bank.

The geographical designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of IPGRI or the CGIAR concerning the legal status of any country, territory, city or area or its authorities, or concerning the delimitation of its frontiers or boundaries. Similarly, the views expressed are those of the authors and do not necessarily reflect the views of these participating organizations.

Citation: Eyzaguirre, P.B. and Pons Batugal (editors). 1999. Farmer Participatory Research on Coconut Diversity: workshop report on methods and field protocols.

Front cover: Zaim Darulaman


IPGRI – Regional Office for Asia, the Pacific and Oceania
P. O Box 236, UPM Post Office
43400 Serdang, Selangor

© International Plant Genetic Resources Institute, 1999
Contents

Acknowledgement and foreword vii

Introduction 1

Farmer's contribution to improving the value and uses of coconut through the maintenance and use of genetic diversity 1
  Pablo B. Eyzaguirre

Farmer participatory methods for coconut genetic resources in Asia-Pacific region 6

Tools for participatory research on crop and tree diversity 6
  Amanda B. King

Use of participatory approaches to agricultural research and development: the CIP-UPWARD experience 26
  Cherry Leah F. Bagalanon and Dindo M. Campilan

The loss of locally adapted tall coconut varieties in the Philippines 35
  Edwin Balbarino

Use of participatory approaches in the South Pacific 37
  Anare Macatu

Participatory research training on coconut biodiversity – PRA tools 46
  Mereseini Nagat Pou

Holistic approach to coconut diversity and value 49
  Pablo B. Eyzaguirre and Elinor Lipman

Testing of participatory methods with coconut farmers 58

Field visits to three communities – Davao, Philippines 58

Coconut stakeholder analysis on Bangladesh 71

Farmer participatory research methods for Solomon 81

Farmer participatory research phases and protocols for participating countries 98

Appendix I. Workshop programmes 104

Appendix II. List of participants 111

A selective bibliography on coconut diversity, uses and genetic resources 117
Acknowledgement and foreword

The contents of this report include the presentations, discussions and protocols produced at the Workshop on Farmer Participatory Research on Coconut Diversity held in both Davao, Philippines, 16 – 28 March 1998 and in Taveuni, Fiji, 24 – 28 March 1998. Two smaller follow up workshops were held in the Solomons and in Bangladesh, the results of which are also included. This volume provides documentation of a work in progress. It is intended as a reference for coconut scientists and development specialists in carrying out participatory field research with farmers. The contributors and participants welcome feedback and dialogue on approaches to foster greater participation of farmers in coconut research and conservation and greater recognition by scientists and development workers of the rich fund of knowledge on coconut diversity maintained by small-scale farmers.

We are grateful to the participants, organizers and resource persons for the timely and useful contributions summarized and presented in this field notebook. The workshops were funded by the International Fund for Agricultural Development (IFAD) under the collaborative IFGRI-COGENT-IFAD project on “Sustainable uses of coconut genetic resources to enhance incomes and nutrition of smallholders in the Asia-Pacific region”.

The Philippine Coconut Authority (PCA) and the staff of the PCA’s Davao Research and Training Extension Center in the Philippines provided a productive and friendly environment for sharing and learning from experiences, and methods for participatory research on coconut diversity. Special thanks to Mr. Romero Blancaver, Mr. Edgar Bahala, and Mr. Carlos Carpio. The assistance and contribution made by the staff of the Taveuni Coconut Centre, Fiji, ensured a smooth transfer of valuable information throughout the workshop. We give special thanks to Mr. Tevite Kete and Mr. Semi Mocesiri of the Ministry of Agriculture, Fisheries and Forest (MAFF).

We also thank the team that produced this volume. Compilation of this report was done by Nicky O’Neill and Amanda King of IFGRI, Rome, Italy. Final editing and layout was done by Shalizhanum Shukor of IFGRI, Regional Office for Asia Pacific and Oceania. We hope this volume will stimulate similar efforts to tap local knowledge of coconut diversity to solve the problems of small-scale coconut farmers.

Pablo B. Eysaguirre
Senior Scientist, Anthropology and Socioeconomics
IFGRI, Rome, Italy

Pons Batugal
Senior Scientist and COGENT Coordinator
IFGRI Regional Office, Serdang, Malaysia

October 1999
Introduction

Farmer's contribution to improving the value and uses of coconut through the maintenance and use of genetic diversity

Pablo B. Eyzaguirre
Senior Scientist, UPGRI, Rome, Italy

Coconut diversity in the hands of farmers and formal coconut research

Farmers who grow coconut are deeply attached to the various products and services of the coconut palm. When they move into areas that are far from optimal for the growing of coconut, they take coconut with them, creating and maintaining microenvironments which allow it to survive. Over time, farmers have contributed to the adaptation of coconut to a range of specific environments by moving and growing coconut even in areas and environments which are marginal to coconut production, namely: high elevations, higher latitudes, drought prone areas, areas subject to heavy winds and a range of soils from stony to heavy clay soils. This specific adaptation under farmer management deserves to be understood and supported. Given the high degree of diversity in these populations, many useful genetic traits for resistance and adaptation have been developed and are being maintained by farmers.

It is recognized that formal coconut research has been a recent and under-resourced effort in relation to the distribution and value of the crop, and the complexity of coconut crop improvement (Persey 1992). Some significant achievements have been made by coconut breeders with the release of dwarf hybrids which have higher yields of copra and oil. Where the copra industry is well organized and efficient, these hybrids have made a positive contribution to coconut productivity and to incomes of coconut farmers. However, many if not most smallholders growing coconut are not well served by industrial copra collecting, marketing and processing infrastructure. The research on coconut as an oilseed has yet to reach the bulk of the coconut producers who are smallholders. This gap may be due to the multiple uses of coconut and the diverse farming systems where it is grown. Narrowing the gap may require a new approach that brings farmers, breeders and genetic resource scientists together to define a wider range of uses for coconut diversity from the genetic level to the final products that reach the consumer.

Coconut diversity and its multiple uses by smallholders

The uses and value of coconut palms to smallholders are far greater than copra and oil. While global and national statistics on coconut production measure yield only in terms of oil and copra, whereas most coconut research and development has historically been classified as work to improve the productivity of oilseeds, this may not be the way smallholders view the coconut palm. As yet there are few studies which calculate the total value of coconut production by including products other than oil and copra. Where such studies exist, more work is needed so that the results can be used as reference for agricultural statistics, policy and the strategies for coconut research and development. Because many small farmers value coconut palms in a different way from the primary values assigned by formal R&D and national agricultural policy, they remain attached to types of coconut populations which are different from the improved cultivars. In cases where higher yielding coconut varieties are available and supported by
development schemes, there is widespread evidence that many farmers continue to prefer their local cultivars. The local cultivars they prefer are tall, with a high degree of diversity within populations, and provide a wide range of products for a long time with minimal inputs and labour.

Social scientists have traditionally been called in to explain to the breeders why farmers are not adopting an improved variety. My focus however is different. The focus of this paper is to call for a better understanding of what diversity farmers are maintaining and managing, and how this diversity within and between populations of coconuts can be used by both farmer and researcher to improve the value and productivity of coconut across a range of products and uses.

**Improving a multi-purpose smallholder tree crop**

If we are to improve the competitiveness of coconut by broadening the use of genetic diversity to increase the value of coconut products beyond copra, some questions need to be raised. Has the near total focus by coconut breeding programmes on oilseed productivity, led to a narrower evaluation and use of coconut genetic resources, and as a result a narrower range of genetic diversity, located, identified, and conserved? From the perspective of the anthropologist concerned with local user's perspective, I would suggest that this is so. Small farmers have a much broader set of useful characters which they value and maintain in their coconut populations. Hence their preference for the tall, polymorphic coconut varieties with a high degree of genetic diversity within populations.

A close partnership between scientists and coconut farmers is needed to identify and use the genetic diversity that exists to maximize the productivity of coconut palms for a wider array of products. Farmers' expertise on characteristics and adaptation of coconut populations for multiple uses is a vital resource to be maintained along with the diverse populations which can provide the genetic basis upon which future multi-purpose coconut improvement will depend. Scientists and farmers together will need to define the goals of coconut research and development. A lack of understanding of the large amount of morphological variation due to the interaction of genotype and environment has in the past led to unrealistic expectations for yield improvement in coconut (Foale 1991).

Where multi-purpose crops are concerned, there will be choices and trade-offs in any improvement programme. Key strategic objectives are whether to use the genetic diversity to select and develop several specific varieties for other uses such as fibre, food, fruit, drink, wood and timber. Alternatively, researchers can work with farmers to conserve and enhance the existing locally adapted populations while retaining the diversity within populations that enable coconut farmers to provide multiple products. The local varieties may not be high yielding along a single criterion such as oil, but when other uses are included and pest resistance is enhanced they may be more productive overall. This paper does not purport to answer a question that is best answered in consultation between coconut researchers and coconut farmers. However, there is the question of the time and cost of producing a new certified variety in coconut, and the fact that small holders are likely to retain a preference for a cultivar that is low maintenance and provides a stable yield across a number of characters. It may be unfair to expect the existing infrastructure for coconut research to focus on varietal development for so many diverse objectives and environments. What is feasible and urgent, however, is for researchers to work with farmers to understand better the local coconut populations which they maintain and the link between that diversity and the range of products and uses of coconut.
Adding value to coconut diversity in small scale farming systems.

There are two levels of diversity in coconut. One is diversity between populations resulting from human and natural selection in different environments. This is the source of much of the diversity we still need to understand and conserve for improving the adaptability and pest and disease resistance of coconut. The other is the diversity found within outcrossing populations. All populations of tall varieties fall into this category of allogamous populations with high levels of diversity (Foale 1991). Given the preponderance of tall coconut palms in small-scale, low-input farming systems distributed across a wide range of environments, and the fact that hybrids are predominant in commercial copra production systems in the more favourable areas, it is fair to say that small farmers maintain the greatest amount of genetic diversity in coconut.

Breeding objectives, farmer-based characterization and genetic resources

Breeding objectives have been largely focused on the oilseed, improving the oil and copra yield of the nut. Other more specific objectives are still focused on the nut, and include improving the protein content, the quality of the fatty acids and other properties of coconut oil and fat (Santos & Sangare 1991). Not surprisingly, the breeding objectives have influenced the evaluation and maintenance of coconut germplasm by formal institutions concerned with coconut research and development. Coconut research centres have access to a very small fraction of the variability that exists within the species (de Nuce 1991). Much of the diversity, which is not accessible to coconut researchers, is in the hands of small farmers in diverse environments growing coconuts for many varied uses.

This pool of coconut diversity and knowledge of coconut uses and local varieties presents an important opportunity if coconut improvement is indeed to be based on a partnership with coconut producers who are in the main small farmers. It also presents an opportunity to maintain and use the great diversity that exists in coconut populations distributed worldwide in a range of environments. Given the costs in time and resources of coconut germplasm evaluations, working with farmers to assess the characteristic of local coconut populations across a set of key criteria would be a useful first step to sample and identity a broader range of diversity in coconut. This should make an important contribution to both conserving existing diversity and expanding the genetic base of coconut improvement.

Partnership between coconut researchers and farmers is essential at an early stage to define breeding objectives, conservation needs, and potential for genetic enhancement of coconut varieties in low input systems. Objectives for coconut genetic resources conservation, use and improvement will certainly need to reflect the uses of coconut. In this particular case the question is not so much one verse another. Rather, it concerns the definition of primary use, and whether varietal improvement aimed at a primary use, copra for example, will limit the identification and use of a wider range of genetic diversity.

Farmers already have existing, indigenous systems of characterization and evaluation of coconut. Their system is primarily based on the various uses of coconut. Since our strategy for coconut improvement will depend on improving its adaptability as well as its productivity and marketability across a wider range of products, farmer-based classification and evaluation of coconut populations is particularly useful. Table 1 describes the more important areas where farmer evaluation of coconut diversity can serve as a first step to the identification and use of diversity for coconut improvement as a multi-purpose crop.
At this stage, coconut production systems are threatened and along with it the livelihoods of millions of farmers with few alternatives. Research and development could aim at the generation of a several new coconut varieties, each aimed at a single product, wood, fresh fruit, drink, fibre etc. in the hopes of increasing the marketability and value of the specific coconut product. Given the time it would take and the current threats to coconut populations and coconut producers would mean that many areas of coconut production might be lost with its attendant genetic diversity. Incomes for millions would continue to erode along with the genetic diversity. Some of the genetic diversity that could provide the basis for future coconut improvement would also be lost. In light of this scenario, a strategy aimed at identifying and enhancing the genetic resources in locally adapted populations of tall coconut varieties may be the first step. Breeders would have the opportunity to identify adaptive traits and resistance to pests and diseases which could be used in coconut improvement. Farmers might be in a position to receive technical support and develop new markets and post-harvest opportunities for diverse coconut products in local industries in the short term. In the longer term the commercial value and export potential of non-oil and copra products is barely tapped.

Farmer participatory approaches to coconut genetic diversity might contribute to several objectives, with high rates of return. One is to develop locally adapted varieties that are able to perform in less favoured environments with few inputs and low levels of husbandry (Persley 1992). Another is to identify uses and techniques to exploit and derive greater value from a wider range of coconut palm products. Farmers are the experts in the multiple uses of coconut palms. Only a few of these are exploited commercially in any single coconut growing region, with the exception of South Asian countries which have truly seen a remarkable expansion of coconut products for the home markets. In most cases, for this to occur, the development of harvesting, and post-harvest processing techniques will have to be oriented to a supply of raw materials that comes from many small-scale farmers.

The ideal coconut palm for these diversified coconut industries will be a multi-purpose tree that retains many of the characteristics of the tall and locally adapted coconut varieties that predominate on small farms. The basis of restoring the productivity of smallholder coconut should begin with an understanding of the value and diversity of coconut populations managed by small farmers. Given the relatively modest investment in coconut research and the vast fund of diversity that remains to be explored, identified and used, the scope for dramatic improvements resulting from a participatory effort is great.

References


Table 1. Characteristics for farmer participatory evaluation of coconut palm diversity

Yield & adaptation to specific environments
- Disease resistance
- Pest resistance
- Extremes of altitude, climate, insolation, and winds
- Soil types
- Use in micro-environments
- Morphology and architecture

Different products
- Fruit and milk production & quality
- Fibre production & quality
- Leaf production
- Oil production & quality
- Wood production: quality and density

Local coconut husbandry and processing techniques
- Planting in micro-environments
- Harvesting techniques for various products
- Frequency of harvesting and parts of the palm used
- Gender specialization and gender-based knowledge
- Exchange of coconut germplasm and sources of new germplasm
Farmer participatory methods for coconut genetic resources in Asia – Pacific region

Tools for participatory research on crop and tree diversity

Amanda B. King
Ethnobotany Intern, IPGRI, Rome, Italy

Farming is a multi-faceted activity that involves economic, biological, social, and land-management decision-making. Farmers play an essential role in shaping the diversity of their crops through this process of decision-making. Their values and needs are reflected in the selection and maintenance of crops with specific and useful agronomical traits and adaptive characteristics. Because farmers are the repository of all the information and experience which inform their individual patterns of crop-management, the study of crop diversity must involve research on farmer knowledge. Participatory research involves working directly with farmers to elicit their knowledge in order to understand the social variables which shape on-farm crop diversity. This type of research should not be an extractive exercise, but a cooperative, reciprocal, and beneficial process for both researchers and participants.

Participatory methodologies incorporate the perspectives of multiple actors whose ideas, interests and identities shape the practice of farming in a given agro-ecosystem. In addition to the need to understand the basis for farmer decision-making and management of diversity, additional reasons for the use of participatory methodologies in research on genetic diversity are to:

- improve the functional efficiency, efficacy, and appropriateness of formal research;
- empower marginalized people and groups so that their own decision-making, research capacity, and ability to make effective demands on research and extension is strengthened;
- gain a better understanding of methods to ensure that different stakeholders' interests are heard and considered equally;
- create guidelines for varied circumstances, such as differences in cultural or regional contexts or in the nature of the research problem; and
- reach an understanding of how addressing the needs of particular groups may have impacts or benefits for wider groups.¹

There are two important questions to be asked in the process of developing participatory methodologies:

- What type of participation is involved?
  Answering this question requires a decision as to whether participation is on a nominal or consultative basis alone, or whether participants will also be involved in the design of the research, the research process, and the deployment of research results.

¹ Adapted from Hillary Feldstein in (1996) CGIAR Gender Program, New Frontiers in Participatory Research and Gender Analysis, Systemwide Programme on Participatory Research and Gender Analysis for Technology and Institutional Innovation, P76.
How is the participatory process managed?
This involves determining what are the goals of the research, who is participating, in what context participation occurs, and what are the criteria for success.

Identifying stakeholders in participatory research
Stakeholders include all those who might help shape the research agenda, who are directly involved in carrying out research, or who are going to be affected by, or use, the results of the research at different stages. Some of these are evident while some will require greater effort to identify. Certain factors to consider include:

- degree of stakeholder differentiation; and
- methods and mechanisms for identifying stakeholders and hidden stakeholders: there are categories of people who share certain characteristics; and there are groups of people which are organized around a particular resource or set of tasks, or an institution, such as kinship or work groups.

Who participates? Gender and other variables
- Are the participants of the research process representatives of the population or of the end users, and why is representativity relevant for the goals of the participatory process?
- Do participants bring relevant expertise to the process?

Answering these questions is the first step in developing a participatory methodology. The issues of representativity and specialist knowledge make the application of gender analysis an essential part of any participatory process. Gender analysis allows the specialized domain of knowledge related to gender-differentiated roles and responsibilities to be assessed and utilized toward the goals of all those involved in the research. The focus on gender should not be understood as denying class, ethnicity, or other important variables that differentiate the users of agricultural research outputs. However, an explicit focus on gender and the application of gender analysis, frequently helps to reveal the sources of variance that may be of importance.

There have been a number of constraints on the inclusion of women and other marginalized groups in participatory research. Some of these include the fact that women are often not included in the public domain, they may not identify with research questions, they may not be allowed to speak to male researchers, or they may be hindered by time constraints which do not allow them to participate in research activities. Because of these constraints, it is important that the following steps become part of the methodology development:

- identify distinct and relevant stakeholders or users;
- find ways to ensure that each category or group is part of the process of articulating its knowledge and priorities as well as collaborating on design and assessment, if it is a relevant stakeholder in the issue in question;
- determine priorities and facilitate negotiations between stakeholders; and
- measure the contribution made by including stakeholders in research outcomes.

Gender analysis

Evidence from previous research has indicated that for forestry species, the gendered division of labour and knowledge is of great importance in determining crop uses and management. While the boundaries that distinguish men's from women's responsibilities are often more dynamic with respect to other agricultural crops, for various reasons the uses and care for tree species tend to have clearly defined, separate use and management patterns based on gender. Therefore, participatory methodologies for research on forestry species must include gender analysis in order to present an accurate picture of the social factors that shape diversity.

There are a number of ways in which gender-specific information can be elicited in participatory research. These tools may also be applied to other types of groups whose knowledge and needs are marginalized within larger groups. Gender analysis focuses on three sets of questions: Who does what, when, and where? Who has access to or control over resources for production? Who benefits from each enterprise? Some answers to the following questions may be gathered using the following research practices.

- Interviews or exercises conducted separately for men's and women's groups: maps, transects, matrices, life histories, focus or community interviews, wealth ranking, ven diagrams, etc. Results of the separate exercises can then be compared to identify areas of both common and different knowledge or interests.
- Separate trials and field days to test technology options and discuss results.
- Researchers engage in participant observation in places where women work and where tasks are done by women.
- Female researchers, field assistants, and enumerators are included on the research team.
- In joint or separate meetings, questions are asked about tasks or enterprises which are known to be in the women's domain.
- Researchers collaborate with pre-existing women's groups.
- Researchers work with NGO partners which have access to women's groups.3

Developing a sampling procedure

An important initial consideration for the collection of socio-cultural data and farmer knowledge is the level of aggregation and the units of analysis to be used. While the "household" is often used as a key point of reference, the definition of household varies according to cultural context. In order to use the household as a basic unit of research, it is necessary to clearly define what is meant by a "household" in a particular community, and to analyze it as both a productive and social unit.

Another consideration is that the use of the "household" as a unit of analysis may hide disparities of knowledge, experience, and power among individuals. In order for all types of community knowledge to be represented in participatory research, it is necessary to look at both inter-household and intra-household variables. Household crop production and farmer decision-making may be influenced by inter-household factors such as the land tenure system or the size of land holdings. In addition, crop management may be shaped by factors within the household such as differential access to inputs, responsibility, and control over products. Because coconut use and management patterns differ strongly according to gender, conducting research with one member of the household may reveal only one aspect of coconut production. In order to capture information about responsibility and ownership, as well as differences in use-patterns and value systems, it is necessary to collect data at both the individual

---

3 Adapted from Hillary Feldstein, New Frontiers in Participatory Research and Gender Analysis.
as well as the household level. In addition, the concurrent use of gender-analysis will help to reveal differences in management decisions, responsibilities, and values that may otherwise remain hidden.

The development of a sampling strategy may start with guided samples based on a small number of households, which can be used to establish the key variables for further study. Methods used in guided sampling include structured surveys, key person interviews, group interviews, focus groups, and more creative and participatory ways of eliciting information. Once this initial information is collected, it is possible to conduct more extensive research. Selection of households for more detailed data collection may take place on either a random or a directed basis.

Various types of sampling strategies include:

- random sampling - the selection of households or individuals on a random basis;
- stratified random sampling - groups or strata of the population are separated for certain features (for instance people with land and landless people), each group/strata is treated as a separate case, and a sample established for each;
- cluster sampling - individuals or households are chosen in groups or clusters and not on an individual basis, and within each cluster, a random sampling method is used (for example, one cluster may be those who plant in a dry area with poor growing conditions); and
- multi-stage sampling - samples are selected using simple random sampling, and from these samples, a new set of samples are drawn.

Tools for participatory research

Outlined below is a list of tools that may be used for participatory research. They are in a rough sequence of how they could be used in the field, beginning with the collection of baseline data to guide sampling, to the more extensive and in-depth studies. This should not be interpreted as a rigid sequence, many tools are useful at multiple stages of research.

Collection of available information

Collection of all existing information should be the first step in any research process because it saves time and duplication of effort, and because it prepares the researcher for interactions with the community. Previously published information, which may be useful for researching crop diversity, are those related to crop ecosystems, the communities which manage them, or to the crops themselves. Existing environmental data, ecological and geographical maps, as well as social or anthropological studies are particularly helpful.

Participant observation

Definition: Participant observation is a classical anthropological tool which has been used predominantly to study community and individual behavioural patterns. Participant observation is the process of documenting observations in a systematic and continuous way, without disrupting the processes, people, or locations being observed.

Uses: Participant observation can be used to gain baseline information about human communities, behavioural or management patterns, as well as social structures and human interactions. In addition, basic observation can be used to assess crop populations, diversity among crops, phenotypic variation, and crop ecosystems. This information can be used to develop a sampling strategy for more in-depth research, or it can be used to support other types of data.
Advantages: Basic observation is the simplest way of obtaining a general understanding of the variables which are going to be researched. When carried to a more extensive level, the observation can provide the researcher with a great deal of easily accessible and highly useful information.

Disadvantages: Participant observation is frequently not the neutral tool that it is intended to be; the mere process of observing often influences the subject that is being observed, and the results may be biased by the individual interpretations of the researcher. In addition, participant observation is not an interactive form of research, unless members of the community act as both the observers and the observed.

Participatory Rural Appraisal (PRA)

Definition: This is an intensive, iterative, and expeditious form of research, which relies on small multidisciplinary teams that employ a range of methods, tools, and techniques specifically selected to enhance understanding of rural conditions by tapping the knowledge of local inhabitants. Its most outstanding characteristics are flexibility, minimal resource requirements, and the central role given to intensive dialogue, varied types of communication, and researcher-community cooperation in order to access community knowledge. Triangulation is a common technique employed in choosing methods, sites, and participants in research, so that a minimum of three perspectives provides a range of variables to be studied.

PRA places a strong emphasis on sharing ownership with participating communities, through the incorporation of community goals and needs into the design, objectives, and uses of the research. With the new questions and insights generated by conducting basic exercises with communities, researchers can move more directly toward understanding problems and facilitating the development of appropriate solutions. Modifications of previous methods, as well as new tools for this type of research are constantly being generated, as researchers develop their own means of working interactively with communities. A partial list of commonly used tools is given below. Most of these tools are effective in eliciting the specialist knowledge related to gender or other factors when conducted with separate focus groups.

Uses: PRA, in particular, can provide useful tools for conducting various types of participatory research. PRA techniques can be used to gain both a general and a more in-depth understanding of community knowledge. A general understanding of community characteristics can help to guide the development of a sampling strategy for further research, while more extensive community knowledge can be used to supplement other types of qualitative and quantitative data.

Advantages: Most of the PRA techniques are designed to be inexpensive and easy for anyone to participate in. They generate a great deal of information in a short amount of time and provide insight into social behaviours and management practices.

Disadvantages: PRA techniques require a good and experienced facilitator. Interpreted out of context and taken on their own, the data produced from these techniques can be superficial. They should be used in conjunction with other tools as a means to generate new perspectives and research orientation.
Partial list of tools
Community mapping
Historical mapping
Transact walks
Ranking, rating, sorting exercise
Semi-structured interviews
Local knowledge forms - folk taxonomies
Seasonal calendars
Labour calendars
Logic/decision trees
Drawing - bar, vein, flow diagrams

Brief tool descriptions
Community mapping/historical mapping
Study of resource management requires knowledge of both the spatial distributions of resources and of how these resources are utilized. These exercises involve the community in mapping with the purpose of generating information about the local environment and social systems, gauging community perceptions of ownership, responsibility, physical or social boundaries, and clarifying relationships between environmental factors and agricultural activities. Using previously drawn maps, participants can identify the exact location of resources and patterns of resource usage. Participants can themselves map local infrastructure, land tenure systems, spatial distribution of crops and their relationship to natural resources. It is useful to do mapping in the field so that it can be supported by direct observation. The information generated from mapping can be used to develop a sampling strategy or to collect detailed data.

Historical mapping can be used to document the history of the community or a certain group within the community, and can be done in pictures, writing or symbols. The timetable may be focused on a specific subject such as natural or communal resource management, or the impact of village growth or economic change on the surrounding environment. This tool can give a temporal dimension to the studies of diversity.

Transact walks
The purpose of transact walks is to provide a good representation of the social or biological variation within an area being studied, as well as to document as much information as possible from direct observation of the community and the local environment. One use of a transact walk is to delimit the main agroecological zones within a community, chosen subjectively as being distinct in terms of one or more ecological, agricultural, social, or economic feature. Another use may be to illustrate the variation and spatial location of social units found within a community, in order to develop an appropriate sampling strategy.

Ranking, rating, and sorting exercises
These tools are simple and inexpensive ways to provide insight into individual or group decision-making and to identify the criteria that people use to select certain items or activities. When used with different groups and compared, they can pinpoint differences in perception, identify priorities, and monitor changes in preference. In addition, they can translate qualitative information into quantitative form. This type of information is valuable for understanding the ways in which communities value and manage crop species.

Ranking - The process of ranking a certain number of items on the basis of a certain criteria. For instance, participants might rank tree species on the basis of their general usefulness, where usefulness is defined by group criteria.
Rating - This process, which works best with literate people, involves rating certain statements or ideas on a scale which runs from complete agreement to total disagreement. For example, participants may be given a statement about a method of crop management and asked to rate how strongly they agree with the statement.

Sorting - The process of sorting a unit according to its characteristics into clearly defined categories. For instance, participants could sort households between three categories of household economics. The defining characteristics of each category can be decided by the group.

Note: Whether ranking, rating, or sorting, select a sample that will be a representative of the community or the group from whom information is required. The design of the exercise should include the input of the participants to ensure the relevancy of the questions, and of the categories that they select. Keep the choices straightforward, and summarize the results in an easily understood format.

Semi-structured interview
Semi-structured interviews are conducted with a fairly open framework which allow for a focused, conversational, two-way communication. This type of interview is useful because it allows researchers to obtain specific quantitative and qualitative information from a sample of the population, to probe for unknown information, and to get a broad range of insights.

Local knowledge - terminology
One method of assessing the diversity preserved in agroecological systems is by determining the specific values that individuals assign to crops, and the reasons these crops continue to be grown and used within the community. Determining the ways in which farmers perceive certain varieties to be distinct, can be accomplished either by questioning farmers about the distinctive uses of the crops, the variation they perceive in crop properties, or about the names they give to different varieties.

In linguistically complex regions where different languages and dialects are found, recognizing and understanding local terminology is important. Using the local terms when asking questions helps interviewers to gather accurate information. In addition, folk taxonomy can be used as a tool to understand how people classify and value resources and environments, which in turn is reflected in their different management strategies.

Seasonal calendars/labour calendars - activity sequences
Preparing seasonal calendars with communities which outline an entire agricultural season, the crop sequences grown, and associated tasks, can supply information on environmental factors, as well as management decisions, value systems, and labour responsibilities. Labour calendars focus on the labour tasks performed throughout the agricultural season. This tool is especially useful for illustrating gender-differentiated responsibilities and crops management. If a particular farm work can be broken down into an activity sequence, it may be informative to ask questions about the individual activities. Separate activity sequences can be determined for years where environmental or community conditions may have altered in order to assess the impact of such changes.

Logic/decision trees
Decision trees can be used to identify distinctive livelihood systems, farmer strategies, and decision-making which shape the management of crop diversity. Decision trees may be constructed from the information gathered in transect walks, through direct
observation, and through interviews. The logic tree can be drawn to classify farmers by types of operation or pattern of resource usage as observed by the researcher. The diagram of the logic tree should include key determinants placed at strategic branching points. The decision tree can be drawn to illustrate the key factors or important conditions that influence the farmer in deciding on one type of cropping pattern or management.

Diagrams
Structured diagrams are a tool for illustrating farmers’ knowledge in a quantified or conceptual way. Bar diagrams, flow diagrams, and Venn diagrams can all be used to illustrate different conceptual properties. Bar diagrams illustrate proportional relationships, such as the proportion of different resources held by different types of farmers. Flow diagrams are designed to show the interrelationships between different variables, such as the interrelationship between production and marketing and the costs and returns at different stages. Venn diagrams would also show interrelationships, often between institutions or groups of decision-makers.

Unstructured diagrams are also a useful tool for eliciting farmer knowledge, especially in cases where the community members are oriented toward visual forms of expression, or do not share similar languages. Furthermore, while each gender knows its role within the production system, this is often in an implicit rather than an explicit manner. A diagram can help record and reflect this knowledge and provide course for further reflection.

Interviews

Group Interviews
Definition: A group interview is a gathering of people with a facilitator for discussion of an issue. The meeting can involve a large number of people or a smaller number who focus on a specific problem or purpose. Semi-structured interviews are those in which there is a specific agenda to be discussed, but there remains a degree of flexibility. This ensures that the individuals discussing the issue are able to modify the direction of the interview according to the information that is revealed.

Uses: Meetings can be used to gather general and commonly shared information. For example, questions may be asked about the community structure and function, the characteristics of local ecosystems, commonly-held natural and agricultural resources, the predominant crop varieties raised by the community, the types of commonly encountered pests or difficulties with certain varieties, commonly held perceptions of the uses and values of particular crops, etc.

Advantages: Meetings are useful in that they reach many people in a short time, they elicit commonly shared information and encourage a flow of ideas between group members, and they help to establish a rapport between researchers and community members.

Disadvantages: One disadvantage of meetings is that while they allow for the sharing of common information, the views and specialized knowledge of certain individuals or marginalized groups are commonly not heard.

Focus Group Interviews
Definition: Focus group meetings are made up of people with similar concerns, who can speak comfortably together, and who share a common problem and purpose. Focus group meetings can be used as a tool to elicit knowledge shared by a certain group which is not expressed in the context of a larger gathering. This information can be compared to that generated by the larger group.
Uses: Focus groups can be used to generate information that is shared among a smaller group of people. Usually all the questions that are raised with larger groups can be raised in the context of focus groups interviews in order to obtain the specific views and specialized knowledge of the group being addressed. For example, focus groups can be asked questions about what are the major uses for a particular species by a particular group, how is the species managed, who is it managed by, and why the species is perceived as useful. Comparing responses made by smaller and larger groups generate insights about the individual groups represented, as well as the interaction between different factions of the community.

Advantages: Views and specialized knowledge which are not expressed within larger groups can be elicited.

Disadvantages: No matter how small the group, there is still a tendency for some individuals to dominate the discussion. To obtain the knowledge of all group members, it may be necessary to conduct personal interviews, or to use questionnaires.

Individual interviews

Definition: These are interviews conducted with one informant in order to elicit the specific knowledge of the individual. Key informant interviews are interviews with individuals who are particularly knowledgeable about a particular issue, who are accessible, and are willing to talk.

Uses: Individual interviews may generate any of the types of information described above, and are particularly useful for eliciting quite specific, individually held information. They also can be used to ascertain unique views, not presented elsewhere.

Advantages: These interviews are least influenced by the physical presence of other members of the community. They are the most direct way of understanding individual knowledge and management patterns.

Disadvantages: In order to be of use when studying a community or a crop population, many individual interviews must be conducted in order to elicit the knowledge and information of a group. Individual interviews are costly in terms of time and other resources.


- Have a clear purpose for the meeting and develop an agenda which includes researcher and community goals.
- Obtain the approval and involvement of local leaders, Be aware of local customs and protocol.
- Arrange a convenient time and place for the meeting, considering both the size and composition of the group.
- Select a practiced facilitator, and plan a strategy to encourage discussions and two-way communication.
- Hold separate focus group meetings for factions of the community who are unable or unwilling to speak up in larger gatherings.
Questionnaires

**Definition:** Questionnaires are lists of questions designed to elicit specific information from individuals or from the primary research samples being studied within a community, e.g. households, groups working on the same agricultural plot, etc. They are usually used with selected samples that have been chosen out of the entire population by means of a rough characterization tool, such as focus groups. Questionnaires gather both quantitative and/or qualitative information. While they may be in the form of a survey which the participant fills out, they are usually a series of questions delivered orally by a researcher who then records the individual responses. Data from questionnaires is pooled and may be analyzed in order to obtain information and statistics related to specific issues.

**Uses:** Questionnaires may be used to gather specific data from a research sample which can be used to support hypothesis, or to explore relationships between variables. This data can be about individuals, households, parcels/plots, communities or ecosystems. Quantitative questionnaires directed to households include questions such as what is the household composition, gender composition, ethnicity living standard, tenure, educational status, etc. Questions about parcel/plots may include the land quality, purchased inputs, labor responsibilities, use of crops, seed source, perceived genetic diversity, etc. Qualitative questions on questionnaires may take the form of a ranking exercise such as the ranking of the values perceived in a crop. This type of information should not replace other types of qualitative information, but should be used in conjunction with other tools, in order to obtain a more holistic picture of the issue being researched.

**Advantages:** Questionnaires allow the translation of individual qualitative and quantitative knowledge into a numerical form. This numerical form is of value because it can be used to measure certain characteristics, to explore the relationship between variables, to gain a statistical understanding of a community or crop population, and to argue for or against hypotheses about communities' maintenance and use of diversity.

**Disadvantages:** The most useful questionnaires are precise and well-constructed tools. To work efficiently, they must be used with a well-defined sample to explore a well-defined issue. They are often quite long and complex, because of the amount and detail of the information being sought. It is essential to keep questionnaires both relevant and concise so that they do not become a burden to the participant or to the researcher. In addition, questionnaires are the least interactive form of information retrieval; they do not typically allow for any reciprocal exchange of knowledge or input from participants in the research process. One solution to this problem is to solicit the help of the community in designing and facilitating the questionnaire.

**Tools for the elicitation of farmer knowledge**

**Interview Techniques:** semi-structured surveys, key informant interviews, the use of focus groups, individual interviews
(e.g. Beebe 1985, Byerlee and Collinson 1980)

**Assessment of Local Knowledge Systems:** Folk taxonomies, farmer classification of land types, traditional systems of organization, oral histories, status distinctions, decision point analysis
(e.g. Warren and Cashman 1988)

---

*Adapted from Larry Harrington, New Frontiers in Participatory Research and Gender Analysis.*
Community Exploration Techniques: Community appraisals, group treks, participatory workshops, rapid site description, transects, biophysical assessments, indigenous indicators (e.g. Chambers and Gildyal 1985, Conway et al. 1987)

Diagramming Techniques: resource flow diagrams, seasonal diagrams, decision trees, problem-cause diagrams (e.g. Lightfoot et al. 1989)

Mapping Techniques: sketches, historical patterns, agroecosystem zoning (e.g. Chambers 1990)

Time Flow Analysis: seasonal calendars, time lines, time allocation studies (e.g. Maxwell 1984)

Farmer Experimentation: farmer’s adaptations, farmer-managed experiments, farmer selection from among multiple alternatives (e.g. Ashby 1987, Quiros at al. 1991)

References


Fig. 1. Gender Disaggregated Activity Calendar

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hot/Dry</th>
<th>Warm/Wet</th>
<th>Cool/Dry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food shortages</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
<tr>
<td>Stumping</td>
<td>SP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hybrid maize</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
<tr>
<td>Traditional maize</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
<tr>
<td>Sorghum</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
<tr>
<td>Finger millet</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
<tr>
<td>Beave</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
<tr>
<td>Groundnuts</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
<tr>
<td>Collecting firewood</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
<tr>
<td>Carrying water</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
<tr>
<td>Feeding small livestock</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
<tr>
<td>Cooking</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
<tr>
<td>Childcare</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
<tr>
<td>Fence and house construction</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
<tr>
<td>Cattle herding</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
<td>XXXXXXXX</td>
</tr>
</tbody>
</table>

Legend
- Female adult
- Female child
- Male adult
- Male child
- Continuous activity
- Intermittent activity
- Transplanting
- Transporting
- Bird scaring
- Storing cut and stack
- Land preparation
- Ridging
- Planting
- Planting by broadcast
- Fertilizing
- Weeding

Gender-disaggregated activity calendar for Mukiashi District
<table>
<thead>
<tr>
<th>Research context &amp; objectives</th>
<th>Methods used for stakeholder identification</th>
<th>Inclusion: Participatory method</th>
<th>Inclusion: refinements for including different users</th>
<th>Contributions: participatory method</th>
<th>Contributions: user refinements</th>
<th>Results for technology design</th>
<th>Project impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key informant interviews</td>
<td>Maps</td>
<td>Separate men and women</td>
<td>Natural resources, enterprises, locations, different neighbourhoods</td>
<td>Men's and women's different knowledge and priorities</td>
<td>1. Acceptability by farmers; adoption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community enterprise analysis</td>
<td>Transect</td>
<td>Joint</td>
<td>Natural resources, enterprises management, landscape history</td>
<td>?</td>
<td>2. Greater cost effectiveness of research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wealth ranking</td>
<td>Transects</td>
<td></td>
<td>Important stakeholders, potential alliances</td>
<td>Differences in perceptions of who are stakeholders; additional stakeholders identified?</td>
<td>3. Contributions of the technology to sustainability, measuring both</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Venn diagram</td>
<td>Separate men and women, owners and hired labor</td>
<td>Importance of weedling to crop production, insect identification, constraints to weedling</td>
<td>Same</td>
<td>4. Impact on family welfare as measured within the household</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant observation</td>
<td>Female researcher with women during commercial weeding</td>
<td></td>
<td></td>
<td>5. Impact on or relevance to specifically poor rural women and other marginalized groups</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tracing pathways on the use of gender analysis and other methodologies for the identification and inclusion of differentiated stakeholders and their contributions to technology design and project impact.
Seasonal calendar for Papua
Source: Conway et al. 1995
Fig. 3. Transect Map

TRANSECT MAP OF THE UNDULATING FARM LAND OF A KHON KAEN FARM HOUSEHOLD

Fig. 4. Flow Diagram – Germplasm Production and Marketing

Flow diagram of seed potato production and marketing in Passu

Fig. 5. Venn Diagram

Venn diagram of institutional overlap in Passu (WO = Woman's organization)
Fig. 6. Bar Diagram – Income and Resources

Bar diagram showing sources of income, amounts of wheat purchased and size of working population for three farmers in Passu. Source: Conway et al. 1985.

Fig. 7. Decision Tree

Decision Tree for Livelihood Systems in Passu
Table 2. Operational Scope of PRA Methods

<table>
<thead>
<tr>
<th>Methods for organization/ operation</th>
<th>Interview team techniques</th>
<th>Individual/ general tools test techniques</th>
<th>Timespace and abstractions</th>
<th>For verbal information</th>
<th>Pre-existing information</th>
<th>On-site observation</th>
<th>Indicators</th>
<th>Physical measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRA interview and training</td>
<td>- Fixed team vs. Rotates (&quot;Sonder&quot;)</td>
<td>- Non-leading questions</td>
<td>- Comp Calendar</td>
<td>- &quot;Focus group&quot;</td>
<td>- Studies/ reports</td>
<td>- Roadbasas</td>
<td>- General</td>
<td>- Tape measure</td>
</tr>
<tr>
<td>- Interview guides (sub-topic)</td>
<td>- Specific protocols</td>
<td>- Specific types of crop calendar</td>
<td>- Open discussion</td>
<td>- Site data</td>
<td>- Site data</td>
<td>- Transsects</td>
<td>- Specific</td>
<td>- Scales</td>
</tr>
<tr>
<td>- Site selection (triangulation)</td>
<td>- Local names</td>
<td>- Specific types of crop calendar</td>
<td>- Common questions</td>
<td>- Site data</td>
<td>- Site data</td>
<td>- Village walks</td>
<td>- Volume</td>
<td>- Volume measurement</td>
</tr>
<tr>
<td>- Use of available information and key informants</td>
<td>- Folk taxonomy</td>
<td>- Main crops</td>
<td>- Comp Calendar</td>
<td>- Studies/ reports</td>
<td>- Village walks</td>
<td>- Field visits</td>
<td>- COUNTS</td>
<td>- Estimation gauge</td>
</tr>
<tr>
<td>- Techniques for team information and decision sharing</td>
<td>- Ethno history</td>
<td>- Main crops</td>
<td>- Open discussion</td>
<td>- Site data</td>
<td>- Site data</td>
<td>- Villages</td>
<td>- Houses</td>
<td>- Field</td>
</tr>
<tr>
<td>- Etc.</td>
<td>- Etc.</td>
<td>- Main crops</td>
<td>- Compact questionnaire</td>
<td>- Studies/ reports</td>
<td>- Village walks</td>
<td>- Villages</td>
<td>- Fields</td>
<td>- Etc</td>
</tr>
<tr>
<td>RECORING:</td>
<td>- &quot;Simplewheat&quot; notebook</td>
<td>- Main crops</td>
<td>- Main crops</td>
<td>- Studies/ reports</td>
<td>- Village walks</td>
<td>- Villages</td>
<td>- Fields</td>
<td>- Etc</td>
</tr>
<tr>
<td>- Cameras</td>
<td>- Main crops</td>
<td>- Main crops</td>
<td>- Studies/ reports</td>
<td>- Village walks</td>
<td>- Villages</td>
<td>- Fields</td>
<td>- Etc</td>
<td>- Etc</td>
</tr>
<tr>
<td>- Visuals</td>
<td>- Main crops</td>
<td>- Main crops</td>
<td>- Studies/ reports</td>
<td>- Village walks</td>
<td>- Villages</td>
<td>- Fields</td>
<td>- Etc</td>
<td>- Etc</td>
</tr>
<tr>
<td>- Tape recorders</td>
<td>- Main crops</td>
<td>- Main crops</td>
<td>- Studies/ reports</td>
<td>- Village walks</td>
<td>- Villages</td>
<td>- Fields</td>
<td>- Etc</td>
<td>- Etc</td>
</tr>
<tr>
<td>- Sketch/ Diagram/ graphs</td>
<td>- Main crops</td>
<td>- Main crops</td>
<td>- Studies/ reports</td>
<td>- Village walks</td>
<td>- Villages</td>
<td>- Fields</td>
<td>- Etc</td>
<td>- Etc</td>
</tr>
<tr>
<td>- Brining back actual items/ samples</td>
<td>- Main crops</td>
<td>- Main crops</td>
<td>- Studies/ reports</td>
<td>- Village walks</td>
<td>- Villages</td>
<td>- Fields</td>
<td>- Etc</td>
<td>- Etc</td>
</tr>
<tr>
<td>- Etc.</td>
<td>- Main crops</td>
<td>- Main crops</td>
<td>- Studies/ reports</td>
<td>- Village walks</td>
<td>- Villages</td>
<td>- Fields</td>
<td>- Etc</td>
<td>- Etc</td>
</tr>
</tbody>
</table>

Examples of potential breadth and depth of PRA methodology

Source: Adapted from Khan Karm, 1985.
Fig. 8 Examples of Geomorphological Descriptors

Land element and position

Description of the geomorphology of the immediate surroundings of the collection site (Adapted from FAO 1990).

1. Plain level
2. Escarpment
3. Interfluve
4. Valley
5. Valley floor
6. Channel
7. Levee
8. Terrace
9. Floodplain
10. Lagoon
11. Pan
12. Caldera
13. Open depression
14. Closed depression
15. Dune
16. Longitudinal dune
17. Interdunal depression
18. Mangrove
19. Upper slope
20. Mid slope
21. Lower slope
22. Ridge
23. Beach
24. Beachridge
25. Rounded summit
26. Summit
27. Coral stoll
28. Drainage line (bottom. Position in flat or almost flat Terrain).
29. Coral reef
Use of participatory approaches to agricultural research and development: the CIP-UPWARD experience

Cherry Leah P. Bagalanon ¹ and Dindo M. Campilan ²
¹Program Associate and ²Coordinator, Users’ Perspectives with Agricultural Research and Development (UPWARD), International Potato Center (CIP) Country Liaison Office, Manila, Philippines

Need and importance of farmer participation in agricultural R&D

Agricultural R&D have been almost exclusively associated with formal institutions and professionals. Institutions and professionals are the ones who usually conduct merited researches. It is only in recent years that we recognized that R&D activities are integral elements of the local knowledge system.

Formal R&D institutions and professionals used to assume entirely the task of offering technological products to users. Now we are beginning to ask, how can we facilitate users’ own R&D activities? How can the formal R&D sector build a partnership with the local knowledge system in working towards shared goals? How can agricultural R&D be made as a joint process of learning and innovation with both the formal and informal systems making their complementary contributions?

Long-term, sustainable development depends on mobilizing people. At the lowest level, however, participation is merely the presence of token representatives of the people at events where decisions are made. Most would agree this does not constitute real participation.

At a more dynamic level, which is meaningful in terms of mobilizing people towards development goals, participation involves an active partnership between policymakers, planners, development workers, officials and the target beneficiaries of a programme. This usually requires some organization of people into groups which become action-oriented and eventually take responsibility for their own development. In the fullest sense, participation is the empowering mechanism which increases the capacity of people to act in their behalf (Stephens 1990).

The UPWARD approach

Recognizing the dilemma of the conventional paradigm, UPWARD pioneers look for alternative approaches to address the seemingly lack of user participation in agricultural R&D. UPWARD is a network of scientist and development specialist seeking to support the participation of technology users in research and development, and with the ultimate goal of contributing to increased sustainability of rootcrop agriculture and food system in Asia.

Launched in 1989 under the sponsorship of the International Potato Center (CIP), UPWARD has engaged in field R&D projects which involve users both as participants in and beneficiaries of the R&D process. These projects, located in various parts of Asia, cover three thematic areas in rootcrop R&D - production systems, genetic resources, and processing-marketing-consumption. In addition to generating relevant knowledge about rootcrops, UPWARD projects serve as a vehicle for testing and promoting user-sensitive participatory approaches (Box I). Most importantly, these projects have been instrumental in pushing for an R&D paradigm shift in the institutions where project researchers are affiliated.
Box 1. Key elements of the user participatory approach

- Sensitivity to users' perspectives, those from different types and categories of users including, not only farmers, but also processors, traders, consumers and other relevant actors;
- Focus on households, taking the household as the basic unit for decision-making and action, including the dynamics of its members and of supra-households;
- Food systems framework, locating technological change within the broader system of food production, processing, marketing and consumption;
- Integration of scientific and local knowledge, drawing on both science-based and local knowledge as complementary resources to support innovation;
- Interdisciplinary mode, bringing together various biophysical and social disciplines whose collective inputs are critical for a successful R&D;
- Multi-agency teamwork, facilitating relevant agencies and other entities representing various sectors and interests to form working partnerships supportive of the R&D process;
- Problem-based agenda, orienting R&D to address locally perceived constraints and opportunities in agriculture and food systems; and
- Secondary crop orientations, recognizing the functions of rootcrops and other secondary crops in order to better harness their agroecological and socioeconomic contributions.

UPWARD views agricultural R&D as a process involving three main interlocking phases, namely:

- Diagnostic phase, which covers the early stages of documentation, situation analysis, needs assessment, problem identification and resource inventory. The outcomes provide the basis for determining the need for and focus of the action research phase.
- Action research phase, which covers the stages of planning, development and testing of feasible options in addressing identified problems and opportunities.
- Local R&D management phase, which covers the stages of scaling up, local-level long-term planning, sustained action, institutionalization, policy formulation and capacity building.

A major interest of UPWARD is in exploring how the formal R&D sector can work in partnership with users by strengthening their inherent capacity to devise solutions to perceived problems. Its field projects seek to demonstrate how users can become actively involved at different phases of agricultural R&D, such as through the following roles:

- Users as consultants, whereby interdisciplinary teams consult with users on perceptions of local systems and needs. Gaining users' perspectives is particularly important in diagnostic, descriptive and assessment activities.
- Users as research partners, whereby R&D professionals and users jointly generate and validate knowledge to address specific gaps, identify and evaluate options for dealing with problems and constraints, and decide on feasible solutions for improving a problem situation.
- Users as R&D managers, whereby users assume leadership and take management responsibility for R&D activities. R&D professionals, meanwhile, support and facilitate local initiatives while continuing to offer options for consideration by users.
Using the above framework, UPWARD researchers have engaged in field projects with users to support local knowledge systems for innovation in rootcrop agriculture. These experiences, from appraisal and documentation to action research and local R&D management, are illustrated through case projects presented in the next section.

Case projects

Case 1: Documenting local knowledge on sweet potato genetic resources

The worldwide effort to collect, conserve and evaluate plant species/varieties has historically been pursued, albeit independently, by the formal and informal R&D sectors. More popularly known are the exploratory missions of the scientific community to collect, characterize and preserve exotic species and those threatened by extinction. Less acknowledged, on the other hand, is the parallel effort of local cultivators themselves, who in seeking to secure means of livelihood, become engaged in a dynamic process of crop/species diversification, multiplication and elimination (Prain 1995). This uneven attention, in favor of the contribution of the formal R&D sector, has led to the marginalization and erosion of local knowledge that would have otherwise complemented efforts of global science towards genetic resource conservation.

While germplasm collection trips are a common practice, the collection of local knowledge associated with these genetic materials seems to be still in its infancy. Germplasm collections come with conventional passport data (e.g. varietal name, location and date) but usually excludes a documentation of the relevant knowledge that farmers have about the genetic materials (e.g. local taxonomies, evaluation criteria, adaptations, practices and other technologies). In the case of sweetpotato, UPWARD has sought to fill in this gap by documenting both the genetic and cultural knowledge linked to the crop's genetic diversity.

One such effort is a comprehensive documentation approach, through memory banking, in a project in southern Philippines (Sandoval 1994b). Memory banking attempts to systematize the collection, storage and retrieval of information on cultural practices associated with traditional crop varieties. Tapping and storing of users' knowledge, beliefs and practices were done through a mix of formal and informal methods (Box 2) for the collection and preservation of herbarium specimens of local varieties, simultaneous with the documentation of farmers' characterization and evaluation of each material collected.

The study found, among others, that users distinguish varieties on the basis of local criteria such as morphological characters, gastronomic quality, life habit, familiarity and functionality. One of the project's concrete outputs is a memory bank containing the herbarium specimens for each variety together with technical characterization, scientific illustrations, and users' own characterization and evaluation. A memory bank complements germplasm collections and offers supplementary cultural information often lacking in standard technical documentation. The logical next step to this approach, which is now on-going (Prain and Piniere 1994), is the preservation of a small patch of land in each region where the local crop varieties can be maintained in situ for purposes of retaining genetic diversity, verifying local names and refreshing farmers' memories (Sandoval 1994b).
Table 2. Methods and outputs of memory banking (adapted from Sandoval 1995a)

<table>
<thead>
<tr>
<th>Specific methods</th>
<th>Domains investigated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection/preservation</td>
<td>Local genetic resources; distribution and diversity</td>
</tr>
<tr>
<td>Remote appraisal/participant</td>
<td>Local patterns of production exchange and consumption</td>
</tr>
<tr>
<td>observation</td>
<td></td>
</tr>
<tr>
<td>Benchmark socioeconomic survey</td>
<td>Patterns of variation within and between farming communities</td>
</tr>
<tr>
<td>Interview with gatekeepers</td>
<td>History from above</td>
</tr>
<tr>
<td>Life history elicitation</td>
<td>History from below</td>
</tr>
<tr>
<td>Diagramming by key informants</td>
<td>Relative salience of different features</td>
</tr>
<tr>
<td>Trials test</td>
<td>Indigenous evaluation criteria</td>
</tr>
<tr>
<td>Sorting/ranking</td>
<td>Local classification preferences</td>
</tr>
<tr>
<td>Verification studies/field and sources</td>
<td>Distribution of local knowledge; degree of consensus, disagreement</td>
</tr>
<tr>
<td>market survey</td>
<td></td>
</tr>
</tbody>
</table>

Case 2: Facilitating farmer research on integrated crop management

Earlier experiences in developing countries have shown that a single technology fix cannot be expected to work successfully under the diverse conditions where farmers operate. On the other hand, given their close familiarity with the local situation, farmers are most knowledgeable in devising a mix of technology options best suited to their own needs and circumstances.

A participatory group learning approach has been tested in southern Luzon, Philippines, through a project focusing on soil fertility management for sweetpotato production in the uplands. In an earlier diagnostic study (Bagasanon 1991), farmers identified the problem of accelerated soil fertility decline and the corresponding need for cost-effective fertility management measures. Later, through a series of community dialogues, joined by various agencies operating in the area, the farmers identified a set of potential technology options which they decided to evaluate via on-farm trials (Bagasanon and Santos 1996). See Box 3. The treatments selected by farmers included:

- Use of complete fertilizer (30-30-30) as recommended by the Department of Agriculture.
- Current farmer practice using inorganic commercial fertilizer, ammonium sulfate (21-0-0).
- Use of bio-organic fertilizer as promoted by a nearby agricultural research center.
- Combination of farmer practice and bio-organic fertilizer use.
- No fertilizer application.
Researchers assisted farmers in field monitoring and evaluation through regular farm observation and discussion. Results of the on-farm trials were subsequently shared and validated in group meetings involving other farmers in the community. Based on data from eight cropping seasons, farmers concluded that the most cost-effective measure was the treatment combining farmer practice and use of bio-organic fertilizer. This conclusion was based on farmers’ evaluation using their own criteria (i.e., yield, marketability, uniformity of tuber size, flesh colour and condition) together with a simple cost-benefit analysis shared with them by researchers (Bagalanon and Jabonete 1996).

During workshops, farmers pointed out that to be able to actually put to use what they learned from the trials, they needed access to the bio-organic fertilizer which was one component of the selected soil fertility management option. Taking it as an opportunity for additional income while providing the necessary input service to farmers, a local women’s cooperative decided to put up a store to sell the fertilizer. Results of the farmers’ fertilizer experiment have also influenced the Department of Agriculture which decided to integrate the trial results into the agency’s technology recommendation. Wider diffusion of the innovation has also been made possible by setting similar farmer trials in nearby communities and the piloting of community media channels such as through print and broadcast. These simple farmer trials have created a broader institutional impact in terms of sensitizing government and private groups to work together in addressing constraints faced by upland farmers in the area. A local task force made up of farmer and community groups and concerned agencies agreed to develop a broad soil management strategy involving other technologies and actions.

**Case 3: Institutionalizing local R&D management for potato production**

A crucial issue often faced by R&D projects is how to sustain the innovation beyond the project life. In order to help local knowledge systems continue the research momentum initiated by field projects, it becomes necessary to institutionalize R&D management at the level of user communities. This is particularly essential for certain forms of agricultural innovation whose impact is contingent upon long-term action and community mobilization. Over the years, UPWARD has explored various ways in which the formal R&D sector can effectively support users in strengthening their capacity to manage local R&D processes.

---

**Box 3: Methods and outputs of soil fertility management (adapted from Bagalanon 1991)**

<table>
<thead>
<tr>
<th>Specific methods</th>
<th>Domains investigated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community dialogue and planning</td>
<td>Elicitation of farmers’ problems and concerns. Identification of problem solutions for possible adaptation.</td>
</tr>
<tr>
<td>Participatory on-farm evaluation trials</td>
<td>Participatory evaluation of identified potential technology option. Capacity building on field monitoring and evaluation among user partners.</td>
</tr>
<tr>
<td>Cross-visits and field tours</td>
<td>Patterns of variations within and between farming. Indigenous evaluation criteria. Local classification and preferences.</td>
</tr>
<tr>
<td>Community validation</td>
<td>Trial results are presented and reactions from community members are encouraged.</td>
</tr>
<tr>
<td>Community/group action planning</td>
<td>Identify possible action points based on project results</td>
</tr>
</tbody>
</table>
One example is in integrated management of potato diseases. Bacterial wilt in the high hills of Nepal has lowered potato production and limited the availability of seeds for sale to growers in lower altitude, thus reducing earnings of farmers. The pathogen, *Pseudomonas solanacearum*, is soil- and seed-borne and as such is easily spread through mechanical means across farms over wide areas. The key disease management strategy is to quarantine a particular farming area and for the affected farmers to collectively apply integrated measures, i.e. elimination of infected plants, prohibiting the growing of host plants, adequate crop rotation period, roguing of volunteer potatoes and ensuring a regular supply of clean healthy seeds (Pradhanang et al 1995).

The nature of the disease and its management requires full community participation, as well as the strengthening and empowerment of local institutions, in order for the innovation to be successful (Figure 1). Given its traditionally cohesive socio-cultural system, Nepal offers a potentially suitable context for field-testing approaches in community management of agricultural R&D.

Bacterial wilt management hinges, among others, on the effective functioning of a village committee to oversee implementation of the various control measures, ensure cooperation by the entire community and enforce sanctions for non-compliance. There were contrasting degrees of success between project villages in the functioning of the village committee, owing to the community members' varying perception on the body's legal identity, police powers and political will. While village institutions were not new in the Nepali culture, given its traditional community spirit and respect for community authority, the informal character of the village committee ran against pressures for food security and income among individual households.

The experience also showed that efforts to institutionalize local R&D among user communities demand support from the wider R&D environment in terms of policies, services and infrastructures. In the case of bacterial wilt management in Nepal, the country's lack of an effectively functioning potato seed supply and certification system have turned out to be the major obstacle towards successfully overcoming the disease problem (Ghimere et al 1996).

On the whole, the community participatory approach seemed to be the only feasible option as yet for managing bacterial wilt, until such time that the formal R&D sector makes available other technology options for dealing with the particular characteristic of the disease. The approach appears to have greater promise in instances where positive ethnic and political relations exist within a community; all community members are committed to achieve the innovation and willing to face certain trade-offs; the village committee achieves legitimization and popular support; alternative sources of food and income exist during the period when potato growing is restricted; and where the significance of inter-community collaboration is recognized (Gurung et al 1996).

Following the advances made with the application of the approach in western Nepal, the approach was tested in Bukidnon, central Philippines. The initial experience quickly revealed several problems with the approach which were not present in the Nepal case:

- Villages are not relatively discrete units as in Nepal, but flow one into the other with no clear boundaries between their lands.
- Land ownership is equally fluid, with cross-village land ownership/use quite common.
- Geographically demarcated areas within villages were not easy to identify.
- Ethnic divisions and a quite strong *individualistic* culture within villages made communal agreement difficult to achieve - the more communal-minded would agree to become involved, but some farmers would always resist involvement.