

Collecting plant genetic resources and documenting associated indigenous knowledge in the field: a participatory approach

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Chapter 12 deals with the importance of indigenous knowledge (IK) of landraces, crops, wild plants and the environment in plant genetic resources collecting. It also describes possible secondary sources of the ethnographic data that germplasm collectors will find helpful, if not essential, when planning their missions. Once in the field, however, collectors will need to document IK for themselves, in Prain's (1993) words 'turning the passport [data] into a potted biography' of the germplasm they are gathering. As suggested in Chapter 12, this requires a participatory approach. Various suitable methodologies have been developed by social scientists, but these may be unfamiliar to many biologists. The aim of the present chapter is to introduce the basics of a participatory methodology for collecting plant genetic resources and the IK associated with them. Chapter 19 discusses in more detail the individual topics that it will be necessary to document in the field. Chapter 38 describes a case-study in which some of the principles and techniques discussed here were actually put into effect during a collecting mission.

Introduction to social science methods

Over the past decade, social science theories of development and the practical methodologies that underpin them have proliferated. Rather than a few comprehensive theories of development (and underdevelopment), we now have a whole variety of interlinked concepts, such as sustainability, environmental protection, gender relations, institutional capacity and empowerment. This has provided a justification for methodological pluralism and flexibility, resulting in the complementation (or replacement) of time-consuming conventional quantitative

survey methods with novel, mainly qualitative analytical techniques. The significant expansion in development assistance during the same period and the subsequent need for rapid methods of impact assessment have also contributed to the development of new methods, and new ways of using old methods.

A list of some qualitative methods is given in Box 18.1 (Chambers, 1990, 1992, 1993; Theis and Grady, 1991). These largely visual methods stimulate discussion, allow the illiterate and the otherwise marginalized to contribute and facilitate communication between insiders and outsiders. They are increasingly seen as ideal not just for tapping IK, but for ensuring that communities benefit from the exercise. Practitioners select from such a repertoire the tools most relevant and appropriate to their particular situation and problem. Several will be of direct relevance to germplasm collectors, and these are described in more detail below and in Chapter 19. Secondary socioeconomic sources are discussed separately in Chapter 9 and secondary ethnographic sources in Chapter 12.

Two main strategies for using these qualitative, visual methods have emerged: rapid rural appraisal (RRA) and participatory rural appraisal (PRA). RRA was developed in the 1970s as a tool for development workers. Meant to replace expensive and time-consuming approaches such as formal large-scale questionnaire surveys, RRA involves relatively short but intensive visits by multidisciplinary teams, the members of which interact among themselves and with the community by means of a whole variety of qualitative techniques to answer specific, preset questions on a particular topic (McCracken, 1988). According to Chambers (1992), there were three reasons for the development of RRA: (i) dissatisfaction with the biases inherent in development work based on hasty visits to the countryside by mainly urban-based professionals; (ii) disillusion with the quantitative questionnaire methodology; and (iii) increasing interest in methods of tapping IK.

Chambers (1990, 1992) describes how RRA evolved into PRA in the 1980s, largely in the hands of activist non-governmental organizations (NGOs) seeking to integrate the whole of a local community (women as well as men, the poorest as well as the not-so-poor, etc.) in a development process generated from within rather than imposed from outside. The term PRA was probably first used in Kenya, to describe the village-level investigations undertaken by the National Environment Secretariat in collaboration with Clark University in the USA. It was introduced into India in a joint exercise of the Aga Khan Rural Support Programme and the International Institute for Environment and Development (IIED) in 1988. It has since spread widely there, mostly in the NGO sector but also in some training institutes. Box 18.2 lists the principles shared by RRA and PRA and the additional points stressed by PRA (after Chambers, 1992, 1993). The differences between the two approaches are summarized by Chambers (1992) as follows:

Box 18.1**Qualitative data collection, analysis and communication techniques**

- Review of secondary sources:
 - historical documents;
 - official reports and statistics;
 - ethnographies.
- Direct observation.
- Do-it-yourself.
- Key local indicators (e.g. of wealth, health, etc.).
- Semi-structured interviews:
 - key individuals;
 - key probes;
 - focus groups, homogeneous or mixed groups;
 - chain of interviews;
 - simple questionnaires.
- Ranking and scoring exercises.
- Contrast comparisons and analysis of difference.
- Construction and analysis of maps and models:
 - interpretation of aerial photographs;
 - on-the-spot sketch mapping;
 - three-dimensional landscape models.
- Group treks and transects.
- Diagramming:
 - time lines, trend analysis;
 - seasonal diagrams (e.g. of crops, climate, etc.);
 - activity profiles and daily routines;
 - bar, flow and Venn diagrams;
 - decision trees.
- Case-studies and stories:
 - life histories;
 - oral or written stories by key people.
- Drama, games and role plays.
- Possible-future and scenario workshops.
- Brainstorming.

RRA is [still] mainly extractive. Outsider professionals go to rural areas, obtain information, and then bring it away to process and analyze. PRA, in contrast, is participatory. Outsider professionals still go to rural areas, but their role is more to facilitate the collection, presentation and analysis of information by rural people themselves. With RRA the data are owned by the outsiders, and often not shared with rural people; with PRA they are owned by rural people, but usually shared with outsiders.

Valuable comprehensive lists of sources of information on RRA/PRA, of relevant organizations and of practitioners in several countries are provided by Chambers (1992). Some of the more important sources

Box 18.2**A comparison of RRA and PRA***Principles shared by RRA and PRA*

- Learning directly from people, in the field and face to face.
- Learning rapidly and progressively, not following a rigid blueprint but adapting and improvising.
- Offsetting biases by being receptive and responsive, not imposing and dictating, and actively seeking out excluded groups such as poorer people and women.
- Optimizing trade-offs between the quantity, relevance, accuracy and timeliness of information, which includes being aware of what is not worth knowing (optimal ignorance) and not measuring more than necessary (appropriate imprecision).
- Triangulating, i.e. using a range of methods, investigators, types of information and/or disciplines to cross-check results.
- Seeking diversity rather than averages, i.e. deliberately looking for, noticing and investigating contradiction, anomaly and differences.

Additional principles stressed by PRA

- Encouraging investigation, analysis and presentation by rural people themselves, so that they have a stake in the results, the outsider adopting a low-profile catalytic role.
- Accepting and adopting the pace of the community.
- Self-critical awareness and responsibility, i.e. facilitators are continuously examining their behaviour, embracing error as an opportunity to learn to do better.
- Sharing of information and ideas among rural people, between them and the facilitators and between different facilitators.

are listed in Box 18.3. The *Qualitative Research Methods Series* (Sage Publications, Newbury Park) gives practical advice on specific techniques.

Towards a method of exploring IK of plant genetic resources

Memory banking

The principles of RRA and PRA have been used to develop a number of thematic methodologies, e.g. environmental impact assessment, institutional capacity analysis, human rights analysis and gender analysis. Warren and Rajasekaran (1994) have produced a general manual for the documentation of IK systems in development work. The first attempt to develop a methodology for participatory IK data collecting in the specific area of plant genetic resources conservation is memory banking (Sandoval, 1994).

Memory Banking entails three phases. During the first, which may

Box 18.3**Information sources on RRA/PRA methodologies**

- *Agricultural Administration's* 1980–81 special issue on RRA, Vol. 8(6).
- Charity Kabutha (National Environment Secretariat of Kenya), Richard Ford and Barbara Thomas-Slayter's (both of Clark University) *Participatory Rural Appraisal Handbook* (Kabutha *et al.*, n.d.).
- Proceedings of the 1985 International Conference on Rapid Rural Assessment. Rural Systems Research and Farming Systems Research Projects, Khon Kaen.
- *Forests, Trees and People Newsletter*, published by the International Rural Development Centre of the Swedish University of Agricultural Sciences at Uppsala and the Food and Agriculture Organization (FAO) Community Forestry Unit, in particular issue 15/16 (1992).
- FAO Community Forestry Unit's *Community Forestry Notes* (Nos. 2, 3 and 5) and *Community Forestry Field Manuals* (No. 2) and other FAO publications, such as *Participatory Monitoring and Evaluation. Handbook for Training Field Workers*.
- *RRA Notes* and other IIED publications, for example various PRA and RRA workshop reports, Theis and Grady (1991) and Gueye and Schoonmaker Freudenberger (1991); this last is one of the few publications on RRA in French; according to Chambers (1990), Ruano (1989) is a useful source in Spanish.
- The *PRA/PALM Series* of MYRADA, an NGO based in southern India.
- The PRA bibliography and various other publications of the Institute of Development Studies (IDS), University of Sussex, UK.
- Various publications of the Popular Participation Programme, Development Studies Unit, Department of Social Anthropology, Stockholm University.
- ILEIA's (1992) series of training handbooks, *Learning for Participatory Technology Development*. Also, the proceedings of the workshop 'Operational Approaches for Participatory Technology Development in Sustainable Agriculture' (ILEIA, 1989).

last a month or more, an effort is made to establish a rapport with the community and 'to arrive at a working knowledge of the agricultural system and the different players involved' (Nazarea-Sandoval, in prep.). Contextual information on the environment, on the human population and on farming systems is also gathered during this period. Specimens of landraces are collected and maintained as herbarium vouchers and perhaps also live in a demonstration garden. This will 'provide a physical record of types against which local names and evaluations can be checked' and an initial indication of the extent and character of genetic diversity within the target crop. This initial phase can be seen as one of 'participant observation', an approach that has long been used by anthropologists in which researchers interact closely with the community by immersing themselves in it for a considerable period, living with their respondents and helping them in their tasks (e.g. Jorgenson, 1989). A conventional structured benchmark socioeconomic survey may follow the initial familiarization phase of memory banking, perhaps administered by specially trained local assistants or enumerators.

The next step in the memory banking process is an attempt to reconstruct local history. The techniques involved in this process are:

- Interviews with so-called community 'gatekeepers'. These are people in authority who can provide an 'official' version of history (which can be presented in the form of time lines of important events, for example) as well as introductions to key informants.
- The elicitation of life histories from knowledgeable, usually elderly, users of the germplasm (i.e. local experts, or so-called key informants) in open-ended interviews, concentrating on changes in varietal composition and agricultural practices during their lifetimes (Crapanzano, 1984).
- Asking key informants to make drawings of different varieties from memory, in an effort to isolate those features most significant to different categories of local users. This is sometimes called cognitive mapping.

Finally, in the systematization phase of memory banking, the relationships among varieties are investigated with the key informants. Triads tests and sorting/ranking tests may be used to elucidate folk taxonomies. A triads test involves presenting sets of three stimuli (e.g. plant specimens) to informants and asking them which one does not belong in the group and why. Nazarea-Sandoval (1992), working with sweet potatoes in the Philippines, found that local criteria commonly used in discriminating among varieties were of five main types: morphological, gastronomic, life habit, familiarity and functional (for example, whether the main product is the roots or the leaves). Informants may also be asked to rank or sort a set of objects, and then to reveal the basis for their choice, or to rank objects according to a parameter suggested by the researcher. Friedberg (1968) describes other methods that have been used to discover the criteria by which classes of a folk taxonomy are distinguished; the informant can be asked to construct a dichotomous key or objects can be presented in pairs and similarities and differences listed. Nazarea-Sandoval (1990) describes other techniques. The result is documentation of the discrimination, characterization and evaluation criteria used by everyday users of the germplasm.

Limitations of memory banking

Memory banking perhaps comes most completely into its own in the context of on-farm, community-level conservation, for which it is ideally suited. The participatory philosophy which underlies it is also relevant to collecting for *ex situ* conservation, of course, but carrying out some of the exercises stipulated by the full protocol may not always be feasible in the context of a 'typical' germplasm collecting programme. The rhythm of memory banking is very much imposed by the cultural context. The problem is that cultures are complex, and collectors' time in the field is often short, for example in the case of emergency rescue missions or because of lack of resources. A month is a long time in botanical and genetic resources fieldwork, whereas a year is a short time in

anthropology. A prolonged period of participant observation is a luxury most collecting programmes will not be able to justify, despite the fact that an extended sojourn within a community will have important practical advantages over the conventional short visit, for example allowing the collector to sample material throughout the growing season, thus capturing earlier- as well as later-maturing crops and landraces. A full-scale socioeconomic survey may be equally difficult to find time and resources for. Even the kind of sequence of long interviews and participatory exercises with several informants which is prescribed by memory banking may not be feasible in some cases.

It should, however, be possible to devise a procedure based on the ideal of memory banking but flexible enough to adapt to whatever limitations of time and/or resources may exist in any particular case. For example, an attempt can be made to make up for the lack of a prolonged participant observation stage (at least in part) by literature-based familiarization with the local culture and local history. Secondary sources may be sufficient to provide a working idea of the way a community is organized socially and economically and of relevant rules, customs and restrictions. The close involvement should also be sought of the local community not just in sanctioning the mission, but also in planning it. Indeed, the inclusion of farmers and other rural people in the collecting team itself should be considered.

There is scope for flexibility once in the field too, and a suitably adaptable field methodology is presented in the next section. It is a collecting system which perhaps tends more towards the RRA than the PRA pole, and is certainly not in the tradition of participant observation, while remaining basically participatory and informant-led. Such an approach has been adopted by the User's Perspective with Agricultural Research and Development (UPWARD) in collecting sweet potatoes in Irian Jaya, as described in Chapter 38. In such an exercise, the informant becomes a veritable 'germplasm consultant' (Prain, 1993). An important tool of RRA/PRA is multidisciplinary teams, and the inclusion of a social scientist in crop collecting teams, as in the pioneering UPWARD work, is clearly as desirable as that of local farmers as advisers, guides and go-betweens. The idea of agricultural and social scientists working together in 'sondeo' teams has also been used in the preparatory stages of on-farm research (Hildebrand, 1981).

A model for informant-led collecting

On arrival in a village or other population centre a meeting with the local authority figure(s) should be arranged, at which the purpose of the visit is explained in detail. Such gatekeepers may include religious leaders, administrators, village elders, extension workers, teachers and the leaders of community groups. Although in many cultures the community leaders are predominantly men, it is important to recognize that women may also be gatekeepers. Particular care must be taken to follow local etiquette and protocol during this initial encounter, and, indeed, at all times thereafter. In particular, it may be necessary to follow a definite

procedure when entering homesteads or the village itself. If it appears from initial discussions that landraces of the target crop are being grown in the village, or that target wild species may be found in the land used by the villagers, the gatekeepers can then be asked for permission to undertake germplasm collecting. They can also be asked for introductions to those people most likely to be willing to participate in the work by: (i) locating and donating local germplasm; and (ii) sharing what they know about the material.

These two groups need not necessarily correspond, or even overlap. Within a community, tasks (including different aspects of agriculture and plant gathering and use), property and knowledge may be divided on the basis of social, economic, ethnic, age and/or gender grounds. Access to particular resources, including land and plant genetic resources, may be confined to one social category, and control of the resources to a different one. Whereas access usually implies intimate knowledge, control need not. Information must be asked of the appropriate people. For example, competitions have been organized among schoolchildren in Botswana to collect seeds: it is they who know the location of the trees with the tastiest fruits (F. Taylor, pers. comm.). Women are the farmers and the main custodians of farming knowledge in many cultures, and thus the best key informants on specific crops and agricultural practices, a fact that has been overlooked in the past. Richards (1985) points out that men and women within the same household may be responsible for different crops, landraces and fields. Cash crops, for example, are often a male preserve. Men and women may even have different tasks within the same field, and also often evaluate landraces according to very different criteria (Ashby *et al.*, 1989). Thus, asking men for information about some crops, in particular subsistence food crops, could lead to misleading answers, though it may still be the men who have to be asked for permission to collect germplasm, whether from cultivated fields or the wild. This is not always the case, however, as the anecdote recounted by Berg *et al.* (1991) shows:

Travelling with an ICRISAT germplasm collection team [in Eastern Equatoria region in southern Sudan] in the fall of 1983, we came to a [Lotuho] village and asked the people for one sorghum head. They said 'yes' and we picked a head from a ripe field. But immediately a woman came shouting . . . at us. It took us a long time to calm her down and find out what had provoked her reaction. It turned out that, as the mother of the house, she was responsible for selection of seed for the next year. It was taboo for anybody else to start the harvest before she had walked through the whole field and done her selection.

Sometimes, particular individuals within the community control, or at least dominate, the production and exchange of planting material. Some farmers are more innovative than others: sometimes these are the poorest, in other cases those with better access to resources. Older people are likely to be the ones most in touch with traditions and will

clearly be the best sources of information on the past. There may be specialist trade groups of resource users (guilds), such as craft workers or local healers, and some such societies are secret. For example, a special class of people, called 'explorers', are the repositories of expertise on pasture quality among the Fulbe, and have the task of seeking out flushes of particularly prized species (A.M. Bonfiglioli, pers. comm.).

Gatekeepers will be crucial in identifying key informants on different topics. However, care should be taken to avoid bias towards the richer, more influential members of the community, such as friends of the village head, or progressive or educated people. Key indicators may be useful in avoiding such bias. House type may give important clues as to socioeconomic status or ethnicity, for example (Chambers, 1987).

In some societies, it may be difficult for a collector to meet the 'best' consultants. This is the kind of information that would emerge at the participant observation stage of a full memory banking study, but could also come out of literature-based research during the mission planning stage. The problem can be overcome by careful selection of the collecting team, for example as regards to gender balance. Where women are known to play key roles with respect to the target species, a team member experienced in working with women farmers is essential. The help could be sought of female members of home economics or community development departments. *Tools for the Field* (Feldstein and Jiggins, 1993) is one of the few published sources for methods and applications which overcome the barriers (which male researchers in particular might face) to reaching women and engaging their active collaboration. The general problems of selection of informants are discussed by Johnson (1990).

It should be possible during the initial meeting with gatekeepers to use brainstorming techniques to compile checklists of the forages or medicinal plants used by the villagers, or of the crops and landraces that are currently grown in the village and surrounding areas, or that were grown at different times but can no longer be found. The reasons why some have disappeared should be discussed, if possible. Such lists can be amplified in the course of visits to local markets. The problems and opportunities presented by markets are discussed more fully in the next section. Gatekeepers should be asked when and where markets are held in the surrounding area.

Some data on 'collecting site context' (Chapter 19), in particular village-level information on land use and farming systems, should also be collected at this stage. In addition to simply answering questions, gatekeepers and others can be involved in drawing seasonal calendars, idealized resource maps and transects of the village and its surroundings. (However, this will be somewhat time-consuming, and may also be kept for a final group meeting of all collaborators.) Conway (1989) points out that these exercises can be used 'to identify the major problems and opportunities in the agroecosystem, and where they are located' in space and time, but they can similarly be used to identify

where wild species, crops and individual landraces fit in the environment, forming the basis of a user-defined characterization of collecting sites. Actually walking along transects with villagers, gathering information on the different ecological zones encountered along the way, is an important PRA tool which can be usefully adopted by germplasm collectors, particularly if combined with an assessment of the changes in land use that have occurred over the years in the different zones.

An idea of official village or community history can also be gathered fairly rapidly at this stage. The timing of some important events may be known from the analysis of secondary sources. What the gatekeepers see as key events in the history of their village can now be recorded, for example the advent of major changes and innovations in land use and agriculture, emigrations and immigrations, natural disasters, years of bad and bumper harvests, and so on. On such historical profiles or time lines can be superimposed time trends (which can also be derived from secondary sources) in important variables, such as population, prices of agricultural commodities (in particular, of the target crop), rainfall, productivity and, crucially, the extent of cultivation of particular crops and landraces. Did yields go up or down between two particular key events on the time line? What did prices do during the same period? Was the population of the village expanding at the time? What happened to the extent of cultivation of landraces vs. improved varieties, and of the more important landraces? These kinds of questions about trends will be important in explaining changes in genetic diversity, cultural practices and technologies, and thus in assessing the extent and threat of genetic erosion.

Collectors should set aside at the very least a couple of hours for this initial stage of the process. The potential key informants, or germplasm consultants, should then be visited with a gatekeeper or a delegate in attendance, possibly as part of a group participatory trek or transect, and germplasm collected with their permission and assistance. Brief consultations should be held with the key informants while collecting and immediately afterwards, in the form of semistructured interviews. Whereas structured interviews use a standard schedule where questions may be open-ended (respondents give their own answer) or closed-ended (respondents choose among a limited number of possible responses), semistructured interviews allow new questions to be added in response to particular answers if necessary. Detailed discussions of interviewing technique are provided by Bernard (1988) and Foote Whyte (1982). Useful practical tips may also be found in Kears (1976). The consultations with farmers should aim to document:

- the household farming system and what the farmer sees as the important features of the exact site of collecting (i.e. the plot or field);
- the farmer's view of the main characteristics of the material collected;

- the methods whereby the farmer produced, selected, stored, processed and exchanged the germplasm.

Cognitive mapping of landraces (and useful wild species, such as forages) and triads/ranking tests may be carried out now and/or at a final group session. This information will find a place on collecting forms in the sections on 'collecting site description' and 'population information', along with pH of the soil, for example, and other scientific observations and measurements (Chapter 19).

Some general guidelines may be proposed for the process of consultation (or dialogue) with local users of germplasm, which is the core of this proposed participatory field methodology. In summary, collectors should make sure they know who to talk to, what exactly they want to know and how to ask. Choice of consultant has already been discussed. The timing of the consultation is also important (Rhoades, 1987). Farmers are busy people, especially at harvest time, when most collecting will be done, and their routine should be disrupted as little as possible. Women may not be available for consultation at the same time as men. A full explanation should be given for the collecting to each consultant, and what will happen to both the germplasm and the data collected described. There needs to be not just consent (i.e. permission) for the work, but informed consent. This will apply to collecting wild species as much as to collecting landraces. It should always be made clear that participation is voluntary. Donor/informants have the right to say no.

It may be useful to keep an alphabetized file of profiles of gatekeepers, key informants and other people met in the field as an aid to memory (Bernard, 1988), but some people might not want their names recorded, in which case an alias should be used. It may be a good idea not to start writing notes and filling in collecting forms until some way into the consultation, or just after it has finished. If there is any doubt, informants should be asked whether they object to notes being taken down during conversations.

Questions need to be framed in an appropriate way. The notion of human health and disease, for example, can be highly culture-specific. Balick and Mendelsohn (1992) point out that disease concepts in Belize, of Mayan origin, often have no equivalents in Western medicine. This underlines the holistic nature of IK. Documenting ethnobotanical data on medicinal plants will require an understanding of local disease concepts, not just local botanical concepts. The collector should be familiar with the local units of time, distance, area, weight and volume (Rhoades, 1990). For many cultures, history is cyclical: the Gabbra pastoralists, for example, think in seven-year cycles (Herr, 1992). A question about the crop varieties grown ten years ago may have to be couched in such terms as 'when your children were young' or with reference to some important happening. The year may be divided on the basis of the waxing and waning of the moon or the movements of the stars, or complex combinations. It is also often important that informants be shown plants (or pests, etc.)

as they are used to seeing them. Asking informants to name herbarium specimens or photographs may not always work. It should also be remembered that local people will not necessarily interpret maps and diagrams according to the collector's own conventions of scale and perspective.

Questions should be precise, but not restricting or leading. A name or a use may apply to only a part of a plant, or to the plant at a certain stage of growth. The mode of preparation of a drug may be very specific. A grass may be palatable only in a particular season, or only to a particular kind of livestock. The collector should be aware of the ways that an ethnobotanical statement may be qualified and 'serially narrow down or focus on the desired information' (V.D. Nazarea-Sandoval, pers. comm.) during interviews, using the so-called 'six helpers' - what, where, when, why, who and how. 'Probes' should be memorized that can be used during interviews to guide the conversation in particular directions and elicit specific information (Nazarea-Sandoval, 1990). Asking for a description of how something is done can be followed up by asking for a demonstration or by asking to actually do it oneself. Croom (1983) lists points that need to be recorded in collecting ethnobotanical information on medicinal plants (see also Waechter and Lejoly, 1990). A list of questions asked in the course of interviews on cassava is given by Boster (1985). Chapter 38 includes a topic list for sweet potato. It is best to see such questionnaires rather as a guide to the collecting of IK, however, than as a rigid schedule. Though it may be more difficult to code and analyse the data afterwards, interviews should be semistructured and questions open-ended.

Farm sketches are helpful in showing the way crops and landraces are arranged in space relative to each other and to important environmental features (e.g. streams, different soil types). It should be possible to produce an idealized sketch showing the typical arrangement after a number of visits. Examples may be found in Esquivel and Hammer (1992). If time allows, the individual consultations can also attempt to document relevant changes that have occurred during the informant's lifetime, in particular the flux of landraces, which can then be related to the official, communal version of history obtained from gatekeepers. The lists of crops and landraces begun at the initial meeting should also be updated continuously during this phase, as necessary.

Sometimes, the whole of the collecting in a particular village or locality can be organized as a group activity, rather than being articulated in separate interviews with individual farmers. This could take place in the form of participatory transects or group treks through the fields (Mathema and Galt, 1989). However, such a strategy will perhaps be especially apt if the visit is taking place at a time other than harvest, when collecting will be mostly from farmers' stores. In such cases, it might be a more efficient use of time to ask interested farmers to bring their material to a central place, rather than the collecting team moving from household to household. The meetings of established local

institutions, which could be anything from a traditional village elders' council to a women's self-help group, pastoral association, or village development committee, may be suitable venues for group discussion of plant genetic resources.

Group discussion will not only permit some immediate cross-checking of information, but debate among the participants may also allow additional details to emerge. It will also save time, and it may be possible to identify people with special knowledge for follow-up individual interviews. Disadvantages include the possibility of domination by certain individuals (or groups, such as men at the expense of women) and the logistical problems involved in getting enough people together in one place at the same time. The locale should be as neutral as possible (Chapter 38). Group size and composition are also important variables. It is probably best if the participants see each other as of fairly equal social standing. Very large and varied groups can be broken up into smaller, more homogeneous working groups, e.g. separate men's and women's groups.

Even when the collecting takes place as a series of separate individual consultations, if possible a group discussion with farmers should always be organized at the end. The evening is often the best time for such a focus meeting. Chambers (1993) recommends that participants in PRA exercises should be available in the evening and early morning, and try to spend the night in the village. In any case, departure should not be abrupt and business-like. Time should be taken to bid farewell in the traditional way (Rhoades, 1987).

Farmers often have very well-defined, traditional systems for obtaining novel planting material. Germplasm collectors should know about and try to fit into such an existing system. In the highlands of East Africa, for example, when farmers want seeds of a particular bean variety they have seen in a neighbour's field, they offer seeds of their own in exchange. Germplasm collectors could do the same (J. Voss, pers. comm.). This would not absolve them of their obligations to the (national) authorities sanctioning the work, any more than simply paying farmers and market stallholders the going rate for planting material would. It would, however, help establish a relationship between collector and farmer based on reciprocity and mutual dependence rather than mere extraction.

IK and some specific practical problems of crop germplasm collecting

Crop collectors face particular practical problems that IK will be essential in helping them solve. The problem of mixed fields is one that will often come up. 'Sometimes, people prefer to maintain diversity in the form of one heterogeneous seed mixture instead of discrete varieties, but often with names for the different types which occur in the mixture' (Berg *et al.*, 1991). For example, Asfaw (1990) points out that only 10% of the barley fields he surveyed in Ethiopia could be considered pure stands of a single locally recognized phenotypic entity. The key point is

how the different entities have been maintained. If seed crops of the different entities were derived from separate, 'pure' fields and only mixed after harvesting to provide the planting material for the particular field being sampled, a case can be made for making a separate random sample of each entity (i.e. landrace) present, or for asking the farmer for stored seeds of each entity. If there has been no separate maintenance of the locally recognized entities for a considerable period, the field should be treated as a single population and a single random sample made, particularly if there is significant outcrossing in the crop. It is then the whole population that represents the landrace, though individual morphotypes within it may be given different names by farmers. Separate samples of these could be taken in addition to the population sample. In Rwanda, farmers grow *Phaseolus* beans (outcrossing frequency 2-5%) as carefully controlled mixtures of varieties. They recognize the individual varieties as different but only grow them in monoculture when testing them out (Voss, 1992). Clearly, a random sample of the mixture will be just as important as pure samples of each of its constituent varieties. In cases such as these, participation of the farmer in the collecting process will be necessary to ensure that the correct sampling method is chosen and that it takes place accurately.

Farmers can also help ensure that modern varieties and recently introduced material are avoided. They will be aware of the origin of the material they are growing. The issue of variation within a landrace among households or villages may be more complicated to resolve. Such variation may be considerable, and of great potential interest to breeders, but confined to characters that are non-obvious, or at least not involved in local recognition of the landrace. In work with a vegetatively propagated crop (sweet potato), G.D. Prain and co-workers relied on a local consultant to identify duplicates within a plot and also avoided similar material with the same name in nearby plots (Chapter 38). However, in more distant plots, and if discrepancies arose, the material and the associated knowledge were collected. Duplicate sampling of each named landrace will be necessary, if not in every village, at least in different agroecological zones and possibly in different districts or market areas, depending on information from farmers and others on the pattern of germplasm movement and exchange in the region.

Collecting from farmers' stores also needs the input of IK. Farmers often actively select the material that they will plant. This may take place at harvesting (the seeds from particular plants being stored separately from the grain that will be eaten) or after the harvest is in, perhaps just before sowing. Collectors need to know if the material they are sampling has been subjected to such selection, and if so the criteria for selection must be documented. Voss (1992) found significant differences between bean samples before and after farmer selection. Material on market stalls may also have been subjected to selection, or may consist of mechanical mixtures of varieties, which could be sampled separately. Markets can be very diverse and serve a large hinterland,

making them ideal early stops for both information and germplasm in a target area (e.g. Berg, 1985). However, farmers often grow some landraces exclusively for home consumption, so that the material available in markets may be a biased sample of the total diversity of a crop in an area. Whether this is the case, and the actual geographic origin of the material, can only be ascertained in discussions with local people.

Corroboration of information

Clearly, 'there is more to plant-human relationships than drawing up a list of actual and potential uses' (Given and Harris, 1992). Documenting IK of wild plants and crops is much more complicated than that, and the accuracy and validity of the information obtained will to a great extent depend on collectors having an understanding of the community in which they are working. Understanding will in turn depend on involving the local user of germplasm fully in the collecting process; hence the importance of a participatory approach.

However, while some thematic methodologies using RRA/PRA methods are quite advanced, this is not yet the case for documenting IK of plant genetic resources. This chapter is merely an early attempt to introduce the theory and practice of RRA/PRA to plant germplasm collectors. Considerable work needs to be done to refine the methodology. Most biologists lack training in the skills of RRA/PRA, and it is not yet common to include a social scientist in collecting teams. Until more experience is available, there will be dangers - as well as opportunities - in using RRA/PRA methods in the context of plant collecting missions. For example, richer farmers and officials may take over and marginalize other groups, such as the illiterate, the very poor, the landless, women and ethnic minorities. Even if the process is properly guided and does not become biased in this way, there will be uncertainty in the qualitative data gathered. In so far as it is possible to do so, information should be corroborated.

A standard interview schedule or checklist (perhaps no more than a set of probes), to be followed for each informant but flexible enough to allow occasional departures, will enable the collector to keep track of which information has been confirmed, and how, and which has not. Corroboration can be done by triangulation. This may mean asking the same questions of more than one person (perhaps in a focus group discussion), or different members of the collecting team interviewing the same informant at different times, or using different techniques to investigate the same topic (e.g. triads tests and ranking to elucidate a folk taxonomy). There is also corroboration by actual observation, for example of the use of a plant or the preparation of a product. Photographs, audio recordings and video recordings can be used to document such observations, though in some cultures this may not be possible. Kirk and Miller (1990) discuss the problem of qualitative data reliability in detail.

It may also be possible to cross-check some information recorded from consultants in the field with material from secondary sources. This leads to the issue of validation of IK by scientific means. Examples of this might be the chemical analysis of folk herbal preparations (possibly followed by clinical trials), the comparison of folk nomenclatures with assessments of the differences among landraces using biochemical or molecular methods and the evaluation of locally favoured landraces for nutritive value. By means of such exercises, scientists can add value to IK, prior to feeding it back to the community. This is the basis on which a true partnership can be built.

Ethics and the collecting of plant genetic resources and associated IK

The implementation of a PRA strategy as part of plant germplasm collecting implies something of a departure from most current practice. Crucially, it means allowing farmers to influence the agenda and pace of collecting missions. It may be necessary to spend a whole morning - even a whole day - collecting in a village growing a dozen landraces of the target species. People more familiar with the cadences of conventional collecting may find this much too time-consuming. Many would say that a couple of hours should be more than enough.

In fact, the methodology proposed here is flexible enough to be abbreviated, if there is time pressure. It can also be confined to a preliminary, exploratory visit, with germplasm collecting taking place during a second visit sanctioned and organized during, and on the basis of, the first. However, given the determining role that local subsistence farmers have played in the generation and maintenance of the genetic diversity of crops, it will surely be generally recognized as necessary that crop collecting should be driven just as much - if not more - by the donor/informants and their requirements as by collectors and theirs. Indeed, some form of participatory collecting will be necessary for wild species too, plants known, used and perhaps actively conserved by local communities, occurring on land they may have communal rights to - not just necessary, but also fitting. Participation will not only ensure that the data gathered will be useful to plant breeders and other formal sector users. It will not only ensure that any statutory or customary rights of ownership or access to land and resources are respected. It will also help to ensure equity, by empowering the local community. A participatory approach that builds on local knowledge, initiatives and resources strengthens the self-help capabilities of farmers and other local people. It confirms or renews their faith in the value of their own knowledge and how it can be combined with outside knowledge or limited external inputs to solve their current problems.

Participation should mature into partnership. At its most basic,

partnership in the collecting process means feeding back the information gathered and the results obtained (e.g. after some kind of validation exercise) to the people from whom it was collected. Numerous techniques may be used for this, including public meetings, workshops, exchange visits, demonstrations and such 'popular persuaders' as plays. Television, radio and other mass media have been used to feed back local knowledge. Such sharing is important, but partnership should reach beyond this. It should help ensure 'resource conservation, local economic development and distribution of the benefits from biodiversity to those who pay the direct or opportunity costs for its maintenance and development' (Reid *et al.*, 1993).

How is it possible to guarantee that, in Bell's (1979) words, there is indigenous exploitation of knowledge (and of genetic resources) rather than merely the exploitation of indigenous knowledge? The Food and Agriculture Organization (FAO) International Code of Conduct for Plant Germplasm Collecting and Transfer addresses the issue, but is mainly aimed at regulating the relationship between collector and national authorities (Chapter 2). Collectors of germplasm and IK are increasingly recognizing that they have responsibilities to local communities too and are engaging in formal or informal negotiations with them for access to the germplasm and information they hold. Various professional and other organizations have developed sets of rules to guide such negotiations and, indeed, the whole relationship between collector and local communities. The Society for Economic Botany has developed a code of ethics for ethnobotanists. One of the goals of the International Program on Traditional Ecological Knowledge is to promote the development and implementation of a code of ethics and practice on the acquisition and use of IK. Some relevant international agreements in the field of cultural property are discussed by Downes *et al.* (1993).

An attempt has been made here to show how at least some of the concepts generally recognized as being of importance in this context at the local community level no less than at the national – such as prior informed consent, equity, the voluntary nature of participation and the right of anonymity of informants – could actually be applied in practice. It has been stressed that the collector should attempt to fit into the indigenous crop germplasm exchange system, and should certainly at all times conform to customary rules regarding access to land and resources. The respect for the local communities who know and have shaped the germplasm, and in whose hands it has been brought down to us, which all this shows, though now enshrined in the concept of farmer's rights and, increasingly, in national and international laws, has perhaps been too long in coming.

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