Interdisciplinary collecting of *Ipomoea batatas* germplasm and associated indigenous knowledge in Irian Jaya

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Introduction

Sweet potato (*Ipomoea batatas*) constitutes a major food source in a number of areas of Indonesia, particularly in Irian Jaya, the western half of the island of New Guinea. Whereas annual per capita production for the whole country is currently around 12 kg (total annual production is a little over 2 million metric tons), in Irian Jaya per capita production stands at around 100 kg (total annual production 180,000 metric tons). In Irian Jaya sweet potato is consumed as a staple mainly in the mountains, for example in the Regencies of Jayawijaya, Jayapura, Panai, Manokwari and Sorong. In other parts of the mountains, taro (*Colocasia esculenta*) is the primary staple and, in much of the coastal areas, especially the swampland to the south, sago (*Cycas circinalis*) is a more common staple. Rice is increasingly consumed in urban centres.

Whereas taro and sago are indigenous to Asia, sweet potato is almost certainly of Central and South American origin (O'Brien, 1972). Archaeological research discussed by Yen (1982) suggests that it may have arrived in New Guinea from South America via Polynesia well before it was introduced into other parts of Asia by the Spanish. Since its introduction into New Guinea it has displaced taro from many areas and has been responsible for major shifts in social and political organization through its association with pig-raising. An enormous number of cultivars have been selected and conserved by New Guinea peoples, attesting to its economic importance.

Collecting and evaluation of this rich New Guinea diversity for improved sweet potato performance there and elsewhere has been conducted almost exclusively in Papua New Guinea (Takagi, 1988), with relatively little collecting in Irian Jaya. Almost no effort has taken place in either region to systematically document local knowledge of New

Guinea varieties in order to accelerate characterization and use of cultivars. This chapter records the preliminary efforts of members of the Root and Tuber Crops Research Centre of Cenderawasih University, Manokwari, Irian Jaya, supported by the User's Perspective With Agricultural Research and Development (UPWARD) and by the Centro Internacional de la Papa (CIP), to systematically collect both the wide range of sweet potato germplasm and its associated indigenous knowledge. It attempts to document both the benefits and the dangers of the methods developed for this purpose. The approach and methods discussed here resulted from a fieldwork-based training workshop held in Manokwari and Anggi, Irian Jaya, Indonesia, on 3–12 February 1992. The results of the fieldwork are reported by Sawor *et al.* (1993).

Philosophy and approach

At least three key reasons for collecting are commonly cited: to enlarge scientific understanding of biological and evolutionary processes; to preserve the world's biodiversity for future generations in the face of severe threats; and to make available new cultivars to farmers and new germplasm resources to plant breeders for the development of improved varieties. Curiously, most of these activities have been undertaken as if collecting is discovering. Whether wild or cultivated, plants are too often automatically treated as unknown genetic packages awaiting only science to reveal their secrets. Often left out of the picture are the originators of cultivated plant germplasm and the specialists of wild species, in other words, gatherers, hunters and cultivator groups the world over. Although many scientists recognize the role cultivators have played in developing the diversity of landraces, far fewer recognize that this is part of a broader expertise which rural people have of their local environments, and hardly anyone has yet tried systematically to incorporate this local knowledge into germplasm conservation and evaluation.

The approach taken in the work in Irian Jaya is to recognize that the assiduous cultivation of sweet potato diversity evident there reflects a sophisticated knowledge of the crop which has evolved with the germplasm. This knowledge is as much a resource as the physical material it illuminates, contributing to more effective use of sweet potato genetic material in the present as well as being of potentially vital importance in an uncertain future. However, like the germplasm itself, this knowledge is in danger of disappearing as new varieties and other modern technologies are introduced. Both are in urgent need of conservation.

Methods

The methodology draws on a combination of conventional collecting practices, rapid participative survey techniques and ethnobotanical elicitation.

Team size and composition

Mobility in Irian Jaya is complicated by lack of roads in the interior (except in the central, Baliem Valley region) and the consequent need to take light planes often limited to four or five passengers. This limits the possible size of the collecting team. In this example, the local team consisted of four people and, since the activity was also part of a training and methodology development exercise, two additional resource persons took part.

From other studies of sweet potato agriculture in Asia, we know that women are often important repositories of expertise and the principal managers of the crop. It is therefore essential to involve local women in the germplasm documentation process. The presence of women in the team can help to ensure female input. One member of the collecting team in Irian Jaya was female.

Interdisciplinarity is a key ingredient of group composition. The spread of disciplines should if possible cover social sciences as well as genetic resources and taxonomy. It is rare, however, for provincial root crop research centres to have taxonomic specialists and in the present case two members of the team were agronomists with exposure to genetic resources issues through attendance at courses. On the social sciences side, the original plan had been to include an anthropologist from the Social Sciences Faculty in Jayapura, but this proved logistically too complicated to organize. Both social scientists were trained in a broad socioeconomics course at the Faculty of Agriculture in Manokwari.

The distinction between multi- and interdisciplinarity needs emphasizing here. Whereas 'multi' implies several areas of expertise and points of view, which is good, 'inter' implies the interpretation, interdependence and sharing of those points of view, which is better. In other words, the team was not expected to establish an inflexible division of labour between germplasm collectors and knowledge collectors. Rather, in mixed pairs or as a group, specialists were expected to take the lead in their own area of specialization, while participating in all types of cultivar and data collecting.

Sampling

The unit for sampling was taken as the individual sweet potato plot rather than the whole of a farmer's holding. Plots were chosen for sampling if a large number of sweet potato cultivars appeared to be growing there. Only plots where the owner was known and could be located were sampled. There was also an attempt to sample plots in all the different hamlets of the village to maximize cultivar range and possibly ecological diversity. These criteria were not always compatible. This led to a slower collecting process than would perhaps have been the case in a more 'conventional' collecting expedition.

For each cultivar found in the plot, five proximal stem cuttings were taken, each approximately 50 cm long. Where only one or two plants of a cultivar could be identified, fewer cuttings were taken to avoid the risk of the farmer losing the variety. Collecting the same cultivar twice in the same plot was avoided, but no attempt was made to avoid collecting what appeared to be the same cultivars from different plots, simply because duplication could not be conclusively determined in the circumstances.

The concept of 'plot' that was used by the team turned out to correspond to a rather complicated notion in Anggi. Rights of access to particular areas of land are determined by tribal affiliation, but ownership or use of particular gardens ('ro') is by household, with a number of kinship-related households often opening a new area together, but separately planting adjacent gardens within the area. Ideally, the sample plot should coincide with the 'ro' cultivated by a single household, in order to make more specific the local knowledge elicited from the farmer. In several cases, however, the enthusiasm of farmer consultants led them to dig up cultivars planted by different households in adjacent gardens. This also complicated the collecting of data on the precise number of cultivars each household managed.

Documentation of information

There are at least three pools of information associated with a plant germplasm collection:

- the genetic make-up of the plant;
- cultural (or indigenous) knowledge about the plant;
- cultural, socioeconomic and ecological characterization of the plant's 'context' or environment.

At the time of collecting, little can be directly learnt about the first information pool, apart from the gross observable characteristics of cultivars. Simplified passport data sheets were used to register the usual passport information (collecting number, location, local name, etc.) and also basic information about each cultivar (skin and flesh colour of roots, root shape, earliness, uses, etc.). Some of the simpler physical characteristics of the sample plot, such as slope, soil type and stoniness, were also recorded on the passport data sheets.

The second and third information pools were handled through a topic guide sheet divided into three sections (Appendix 38.1):

- the ethnobotany of *Ipomoea batatas* and individual cultivars;
- characteristics and management of the sample plot;
- broader 'contextual information' about local cropping, farming and livelihood systems.

Topic guides were worked out during the pre-fieldwork planning sessions based on the available secondary information, the field experiences of the local team members and a reconnaissance trip conducted in the area some months earlier. These were then amended and improved during the fieldwork itself.

Data were collected using a range of different methods.

Informal interviews

Informal interviews with individual farmers were conducted during the extraction of roots of individual cultivars, to gather preliminary cultural information on the cultivar and on the history of the plot. This type of interviewing proved more successful for gathering data on the plot than on individual cultivars, since it was found that discussion of a cultivar in isolation is often difficult and that there was little time to get into great detail while also collecting and labelling specimens. It was therefore decided to limit questions and observations on a few major characteristics of the cultivar (local name, plant type, flesh and skin colour, time to first harvest, etc.) and to concentrate on gathering information on the plot. The rhythm of collecting proved to be an occasional source of conflict between team members from different disciplines. The collecting of specimens and the filling out of basic information in the passport form was relatively easy and fast. Elicitation of more detailed information on the plot and the cultivars was much more time-consuming, limiting the number of plots that could be sampled in a day. A second type of interviewing with individual farmers was conducted in their house later in the day, to go over the evaluation of the cultivars in detail.

Individual interviews were not initially very satisfactory. This could have been partly due to the elicitation method used at first, which involved discussions of individual cultivars in turn, rather than comparing and contrasting cultivars. It was also partly due to the sort of people whose plots the team were first taken to and who were the first interviewees, local political leaders and perhaps not necessarily the real experts on sweet potato cultivars. Obligations to these local leaders, who grant permission for collecting to take place at a locality, must of course be honoured. However, care should be taken that they do not derail the search for local expertise. Wider testing of comparative evaluations with a range of local people, especially women, should be attempted. On several occasions the team subdivided, and the female team member led interviews with women farmers. These worked quite well when conducted in the home, but in the field the men who were present tended to answer for the women.

Key informant interviews

Key informant interviews were used mainly to obtain contextual data and to a lesser extent to discuss the classification and other aspects of cultivars. An employee of the Kecamatan (local District Administrative Office) served as a key informant for the village of Iray. A Rural Secretary acted as a key informant for the village of Сururey. Both key informants were respected elders in the villages where they hold these posts. To understand local cropping practices and the farming and livelihood structures, a number of participatory rural appraisal (PRA) techniques were used as part of these key informant interviews:

- A personal biography was elicited to help understand the dynamics of the local communities and significant local events.
- Transects were drawn of both villages to show different local uses of land and resources and to highlight potential problems associated with resources degradation (Fig. 38.1).
- Social and resource maps were used to characterize land distribution and important institutions at the sites (Fig. 38.2).
- Seasonal and yearly calendars show cropping systems and farmer management activities and work diagrams show the division of labour between men and women (Fig. 38.3).
- Planting material flow diagrams help to illuminate the management of continuity in plantings (Fig. 38.4).

In retrospect it would have been possible, and perhaps more beneficial, to have involved groups rather than key informants in these PRA activities.

Group interviews

Group interviews with farmers were found most successful and quickest for the elicitation of salient characteristics of cultivars. Two modalities were tested. The first was in the field plot, immediately following the sampling of the different cultivars. Both cuttings and roots were harvested, labelled and documented in the passport forms. They were then laid out in an open area of the field. Once all the specimens were laid out in this way, the farmer, his family and any other people present in the plot (usually many!) were invited to gather around the cultivars to discuss them. Using the topic list as guide, the discussion moved through different aspects of the cultivars, from ease of establishment, rate of formation of roots, plant habits, reaction to stresses, ease of harvesting and then the whole postharvest area of ease of cooking, different aspects of taste and storability. The field setting proved very dynamic, with interventions and side discussions, so that recording of opinions and evaluations proved to be quite difficult.

The second modality was to gather a group of farmers together in the evening to discuss the cultivars in a more leisurely way in a public or private location. This allowed more concentrated discussion in an environment where it was easier to record the observations. The site chosen by village elders in Sururey was the unoccupied house of the local forestry technician, which was also where the team stayed. This may not have been the most neutral of sites and probably contributed to the largely male elder composition of the meeting, excluding a potentially important part of local knowledge.

The aim of these group discussions was to elicit comments on those cultivars which were most positively or negatively noteworthy with

Type of Land	Upland	Midland	Marshland	Lake
Soil	Compact clay soil	Loam with stones	Organic	
Crops	None	Planting on the agricultural land is divided into 2 cycles: Cycle I: kidney bean, maize, sweet potato, pumpkin. Cycle II: kidney bean, maize, sweet potato, pumpkin, shallot, garlic, onion, carrot, potato Homeyards fertilized with household rubbish and planted with potato, maize, sugarcane, garlic, shallot, onion, carrot, celery, sweet potato	Drainage canals built on the marshland to enable the planting of kidney bean, maize, sweet potato, pumpkin, shallot, garlic, onion, carrot, potato	
Livestock	*Kaskus*, birds	Dogs, pigs, chickens, ducks and goats	Dogs, chickens, goats	Fish, eels
Other products	Rattan, firewood, building materials			

Fig. 38.1. Transect of the village of Iray showing the distribution of natural resources.

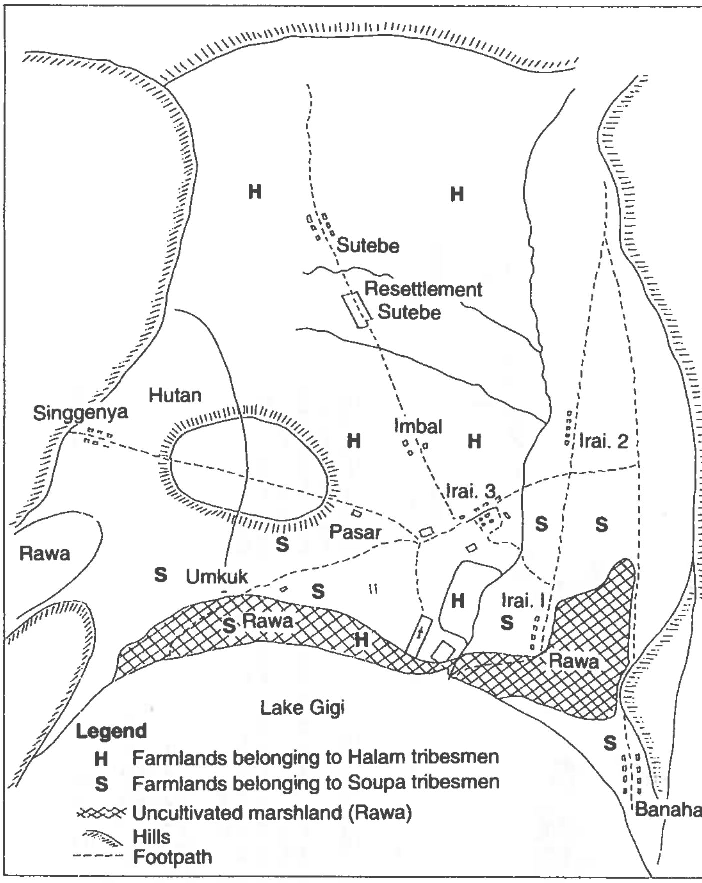

Fig. 38.2. Map of the village of Iray.

regard to a particular characteristic. Discussion of characteristics was iterative, the mention of one aspect (sweetness, say) provoking group members to raise and discuss related aspects (for instance fibrousness). This approach has the advantage of quite quickly establishing a consensus on the important characteristics possessed by certain cultivars (Appendix 38.2). Its disadvantage is the inability to characterize some of the more 'middle-of-the-road' cultivars, which are neither 'famous' nor 'notorious' for any particular characteristic. Ideally, this procedure should be more 'visually iterative'. Using a blackboard or flip chart, the assembled cultivars should be characterized by the group in the way described, so that the group can recheck and complete characteristics assigned to 'extreme' cultivars and can give more attention to 'mediocre' cultivars. This is an adaptation of a technique used to evaluate unfamiliar varieties in Latin America (Prain *et al.*, 1993). A similar argument is made in favour of the use of the triad test to identify salient evaluation characteristics (Sandoval, 1994).

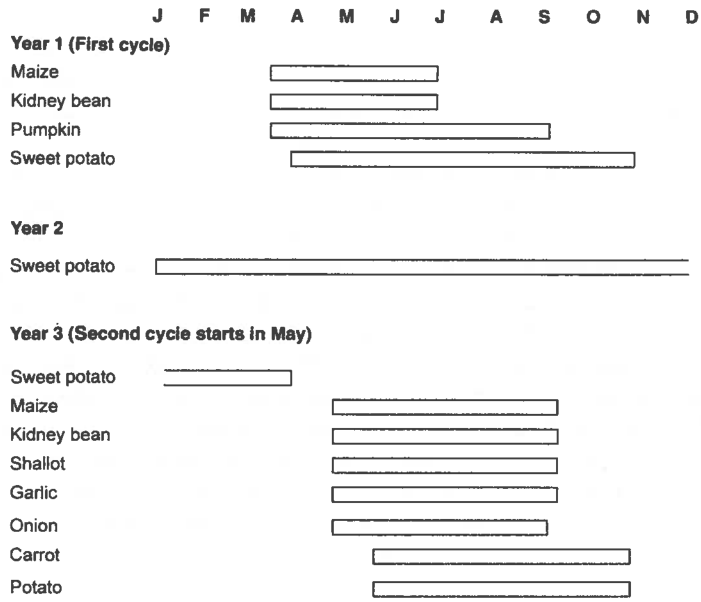

Fig. 38.3. The cropping calendar at Iray and Sururey.

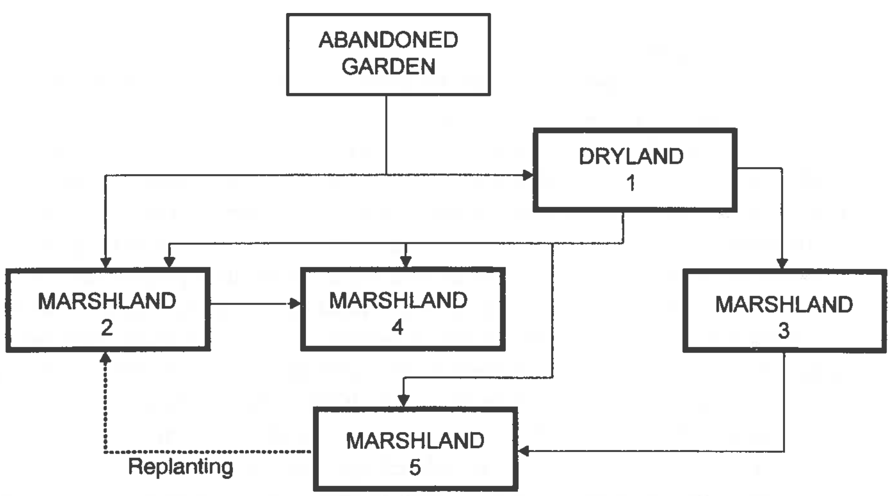

Fig. 38.4. Planting material flow diagram for the plots owned by Markus Ahoren at Sururey. Planting material is generally obtained from old gardens. The planting material for a particular variety normally originates from more than one plot. This is so that sufficient quantity and adequate quality of material can be obtained. Maintaining a constant supply of cuttings is complex and involves the sequential planting and maintenance of plots. This diagram gives a specific example of a household 'seed' supply system. Each box represents a garden plot. Numbers give the sequence in which plots are planted and the arrows show the flow of planting material. Plot 1 is the oldest existing garden. The material there came from a now abandoned plot.

Care needs to be taken that the zeal to document local characterization of cultivars does not result in forcing people to assign characteristics just to please collectors. In general, farmer knowledge of crops seems to be strongly focused at a 'generic' level (Berlin, 1992). That is, there is knowledge of sweet potato, of cassava or of taro, but knowledge of varieties within these crops is likely to be selective and tends to be comparative. This is why the group discussions of all varieties together produced most information.

An alternative approach to ascribing characteristics to cultivars is to start by eliciting what the locally important characteristics are. This can be done by open-ended interviewing, by systematic farmer evaluations in trials (Ashby *et al.*, 1987; Prain, 1993) or by the triads test. In triads testing, farmers are asked to compare sets of three cultivars and to identify which pair is most closely related and which is the odd one out. The criterion for relating and discriminating these cultivars is left up to the farmer. In this way, the characteristics which are used for discrimination are identified (Sandoval, 1994). This procedure is time-consuming and therefore perhaps more suited to extended research in a single community or to 'multiple visit' collecting, rather than the 'single-visit' expedition of relatively short duration described here. This is even more the case with trials, which require a lengthy commitment by both farming families and researchers and could well be the next stage after collecting.

Data recording and synthesis

As already mentioned, a simple passport sheet was used to record basic identification data and some additional observational data on both the cultivars and the sample plots. Individual notebooks were used by all team members to record information coming from local people on particular cultivars, either during the collecting process itself or during the evaluation sessions. Additional local information on sample plots, contextual data on farming systems and local social and political structures as well as personal observations were also recorded in these notebooks.

Every night, members of the research team discussed, debated and brainstormed over the specimens collected and the individual notes and observations recorded during the day. From these discussions, a single daily record was made which was structured around the topic guide and linked to the specimens via a collecting number.

After the expedition, three simple relational databases were established for basic passport data, plot data and ethnobotanical data. Ideally, a fourth database including 'contextual' information amenable to matrix-type storage could also be added (Fig. 38.5). These databases were related via the accession code and a sample plot code.

The principal difficulty of data recording and data storage concerned what may be called textual or discursive information. In fact, it is rather difficult to pin down exactly how to describe this 'problem' information. It is sometimes referred to as 'qualitative', but this term is misleading

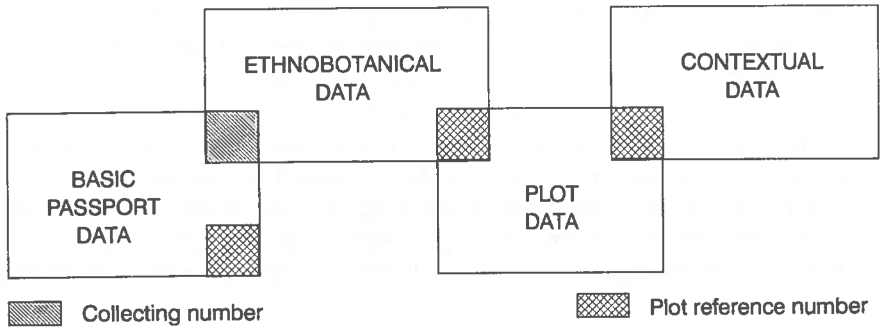

Fig. 38.5. Organization of sweet potato germplasm and indigenous knowledge data.

since some particular qualities, such as root colour or shape, are relatively easy to categorize and were recorded without too many problems by the team. This suggests that the issue is not whether information is qualitative or quantitative, but, rather, the ease with which data can be divided up into discrete 'bits' of information. Information already presented as numbers, such as dates, prices, yields, etc., is easily recorded and stored in databases. Non-numerical information, such as colour, taste or shape, which is associated with conventional classification schemes can also be digitalized in the process of recording and hence easily stored. There will often be information loss in this process, however, and sometimes distortion. A description such as

variety *X* has a blue-black colour

may become recorded as

variety *X*: colour = purple

to conform to a pre-existing classification scheme. This would defeat a major aim of the ethnobotanical elicitation work, which is to understand how local people structure and classify plants falling within the 'genus' sweet potato. The greatest problems, however, occurred where no guide existed for a 'translation' into a classification scheme. The practice of giving part cooked and part raw roots of certain cultivars to pigs and the reasons for doing this, for example, which were described by one farmer, were either not recorded, or were recorded as

variety *X*: use = pigfeed

This is a formulation which is readily included in a database but which loses most of the information in the original statement.

Part of the explanation for these difficulties lies in the training of technicians and researchers. Scientists expect to collect data that describes in the most precise way possible the reality under investigation, so that interpretations and analyses can be made 'from the outside'.

There is little preparation for collecting data that include local people's explanations of their practices and technologies. Explanations are least amenable to translation into classification schemes. They require the technique of précis or summarizing, which is unfamiliar to most technically trained researchers. A great deal more effort needs to be dedicated to expanding these skills if researchers are to succeed in fully documenting ethnobotanical knowledge of crop genetic diversity. At the same time, data storage techniques need to go beyond the use of 'memo' fields in conventional databases in order to really make use of textual information.

Handling of specimens

The cuttings of each specimen were wrapped in damp newspaper to preserve them during the period of the collecting mission. The perishability of cuttings means that sweet potato collectors have two options:

- plant out the specimens during their period in the field;
- stay in the field for short enough periods to allow the successful transfer of specimens to the *ex situ* gene bank.

A third possibility would be collecting roots rather than cuttings. The disadvantages of this are mainly the weight factor and the increased chance of spreading disease.

Conclusion

Though systematic plant collecting has a long history in Western science and the documentation of ethnobotanical knowledge has been for several decades a recognized subdiscipline of cultural and social anthropology, the integration of these practices is only just beginning. The work described here was a preliminary attempt to define a toolkit of methods which can contribute to that integration.

The dynamics of the 'interdisciplinary' relationship during collecting was very variable. Though the overall rhythm of the work was determined by collecting needs, documenting multiple spheres of knowledge clearly takes more field time than simply labelling a sample and giving it a number. The experience so far is that the biological team members find the discussions with farmers very rewarding and see the benefits of having this information at an early stage. Of course, the boundary dividing useful and superfluous information will depend on the perspectives of different disciplines and will always need to be negotiated. For example, biological scientists had difficulties justifying collecting data on ritual practices associated with crops and farming, even though anthropologists have clearly documented the seamless interconnectedness of 'economic' and 'ritual' knowledge and action in many societies (Sahlins, 1972). As it turned out, in this exploratory effort, ritual data were negotiated out of existence. In future, different intensities of data gathering will need to be established for different spheres of knowledge. We need a minimum core set of ethnobotanical and sociocultural data which will have to be defined, but there should also be opportunity for follow-up where important issues arise in other spheres lightly touched on.

Collecting germplasm is expensive and collecting indigenous knowledge as well considerably increases the costs. These extra costs can be justified by the increased utility of 'known' material for other farmers and scientists versus the relative uselessness of anonymous accessions. However, though the detail of documentation is constrained by the utility of what is documented, it should not be totally determined by it. Use value either for genotypes or for local knowledge cannot be fully known. Biological and cultural diversity need to be conserved for an uncertain future.

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Appendix 38.1
Topics and subtopics for collecting contextual and cultivar information

Contextual information

Contextual information is defined as information (obtained through observation and interviewing of different informants) on the functioning of the local agricultural system, with particular reference to common practices in the cultivation of sweet potato.

Location (district, village).
Altitude.
Source of information:

- group of farmers (random, local leaders, women, etc.);
- individual farmer (name);
- key informant (name and identity).

Population:

- approximate size, type and name of ethnic group;
- presence of migrants;
- history of the settlement;
- demographic features (migrant males, predominance of an age-group, etc.).

Transect of locality, with member of village if possible:

- main agroecological zones;
- associated soils;
- associated crops;
- associated livestock;
- associated problems;
- associated opportunities for improvements.

Calendar of activities (associated with rainfall and other climatic factors if possible):

- crops (especially sweet potato);
- livestock;
- male labour;
- female labour.

Sweet potato cultivation

Cultivars:

- approximate number of cultivars in the locality;
- why plant many cultivars?

- compare number with the past: more or less?
- why do cultivars disappear? is it important?
- interest in conservation of wide range of cultivars;
- who plants most cultivars these days?
- important outside sources of information.

Planting material:

- types used under what circumstances (be specific – tip cuttings, basal cuttings, root combinations);
- sources of material (individual maintenance system, links with neighbours, etc.);
- form of planting (number of cuttings, how placed in ground, etc.).

Land preparation, by zone.
Planting (use of mounds, on flat, 'pressing under' in garden, etc.).
Cultural practices:

- hilling up;
- weeding;
- use of organic/chemical fertilizer;
- presence of insect pests and diseases;
- use of synthetic and/or 'rustic' pesticides;
- presence of other stresses (water logging, drought, rats, etc.).

Ritual practices associated with sweet potato:

- at planting;
- use in rituals;
- use for curing;
- links to women;
- at harvest;
- with food preparation.

Uses of sweet potato tops and roots, by zone:

- estimation of percentages going to different uses;
- estimation of change in percentages during past 10, 20, 30 years;
- how does marketing system work?
- storage, if any;
- processing, if any;
- consumption.

Assessment of overall role, likely changes.

Sample plot for variety evaluation

Farmer details:

- name;
- number of family members;
- total area of farm;
- type of tenancy;
- most important crop;
- area of sweet potato.

Plot:

- agroecological zone and cropping system type;

- size;
- other crops.

General comments on sweet potato crop:
- production problems;
- diversity of cultivars: what is the advantage?
- grouping or classification of cultivars: what are the major categories?[1]
- has the farmer encouraged diversity by preserving new types?
- marketing issues, prices, etc. of sweet potato.

Comments on cultivars planted

Collecting number.
Local name(s) of variety:

- known by other names elsewhere?
- widely distributed over locality/other localities?

Physical characteristics (described by farmer):

- root shape and form;
- root skin and flesh colour;
- plant type (spreading, compact, where are roots deposited? is it a problem?);
- plant colour, texture.

Vegetative period (minimum and normal).
Productivity of roots:

- number of roots;
- size of roots: which important?
- performance in different soils;
- performance over the last few years.

Productivity of tops.
Quality of root: floury, watery, sweet, dry, fibrous, other, do family members seek it out on the plate?
Quality of leaves: do people/animals eat them? if so, what is important (succulence, non-hairiness, etc.)?
Effects of climate: special problems or advantages compared with other cultivars?
Effects of insect pests: special problems or advantages compared with other cultivars?
Effects of diseases: special problems or advantages compared with other cultivars?

Appendix 38.2
An example of indigenous knowledge of varieties recorded in Anggi, Irian Jaya

Classification and naming of varieties

Opportunities for collecting detailed information on the way varieties are classified and named were limited. Though important, this is complex and time-consuming and it was decided to give preference to the collecting of performance and quality data. When working in unfamiliar local languages, even just collecting variety names presents problems. In our completed list of varieties,

[1] This information will most effectively be elicited during the comparative evaluation of cultivars.

several names appear in more than one colour category, and others have very closely related orthographies, which could reflect mistakes in transcription. On the other hand, different varieties sometimes have the same name, and only careful characterization can eliminate duplicates and differentiate varieties.

Skin colour seems to be the principal criterion for classifying sweet potato varieties in Irian Jaya, though some informants use flesh colour. This ambiguity is also found in other areas (Acheta *et al.*, 1990). There are three main varietal classes based on skin colour: 'reds', 'whites' and 'yellows', plus a residual category. Information collected on an earlier visit to the area suggested that 'yellows' may be more recently introduced varieties (Prain and Mok, unpubl.). No information was collected on categorial characteristics of 'reds' or 'whites'.

Naming of individual varieties occurs through various ways. The simplest describes the person making the initial introduction or the place from where the variety was brought. For example, variety 'Mirer' was introduced by a missionary called Miller, whereas, 'Tiom' was introduced from the area of Tiom in the mountainous region of Jayawijaya. Other names derive from the morphology of the plant. Informants say 'Aug' mobatkej' (transcribed 'Aug' atkach' during the first visit), which means 'hard', referring to the flesh quality. Some names combine both external and quality characteristics, for example 'Bebau bob' (previously transcribed 'Aug' behop'), meaning 'white and hard'.

Although some names refer to the colour of either skin or flesh or other characteristics of the storage root, farmers seem to find it easier to identify the variety of a given sweet potato from its plant characteristics rather than its storage roots.

Indigenous characterization of varieties

Information on comparative agronomic performance was rather difficult to elicit. This may be related to the almost exclusively subsistence status of the crop. There are no major pests or diseases to which varieties may differentially respond. There was an interest in 'months to harvest', meaning the length of time it takes before large roots can be harvested. Five varieties were identified as maturing in four months, which is early for this altitude. No information is available at the present time on relative yield performance or on differential responses to abiotic stresses.

The identification of 13 varieties as 'spreading' is more an observation than cultural knowledge. In terms of formal descriptors (CIP/AVRDC/IBPGR, 1991), these varieties should probably be described as 'extremely spreading', since a preliminary *ex situ* evaluation of the material suggests that almost all the varieties from the area are spreading types (Mok and Schneider, 1993).

Local people consulted on the varieties showed much greater interest and willingness to differentiate varieties according to consumption characteristics. Characterizations were made according to ease of cooking and by cooked root texture and taste. As with most of these characterizations, only varieties most associated with particular qualities were mentioned, other, 'mediocre' varieties being simply left out. Only four varieties were identified as really notorious for their 'hardness' in cooking, while eleven varieties were noted as 'soft'. This latter characteristic needs further elucidation, since it has both positive and negative aspects. When associated with a high level of 'dryness' of texture (perhaps the case with 'Bekau ayosei' or 'Ayoseiya' and 'Bekau arpokmoi' or 'Arfokngoi', which are identified as 'dry'), it may have a negative connotation since the variety would easily disintegrate in the water. On the other hand, other varieties simply cook easily and quickly.

In terms of texture, local people evaluated the varieties by degree of 'fibrousness' and degree of 'wateriness' of roots. Fibrousness is also a quality which requires greater clarification to differentiate between a normally fibrous quality of the variety and the susceptibility of some varieties to become fibrous the longer they are left in the soil. These would be varieties which are not adapted to piecemeal harvesting.

Evaluation of taste focuses on the sweetness of the variety, with the majority regarded as 'sweet' and a few identified as especially sweet or as lacking sweetness.