Conservation for development: the relevance of indigenous rootcrop knowledge in Irian Jaya

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Abstract. Based on work conducted for the project 'Preservation of sweetpotato biodiversity in Indonesia," this paper proposes a few conclusions, and discusses the significance of this research. The focus is on Irian Jaya where sweetpotato is a staple crop and cultivation has developed to high levels of sophistication. Beginning with a short overview of the components of sweetpotato knowledge among local farmers, it is shown that many aspects of IK are rational and effective tools in crop management and the use of genetic variability. More specifically, selection for perceptual difference in varieties has been an important factor in the development of varietal diversity. Local communities need continuous access to genetic diversity for future use and development of their sweetpotato genetic resources. Different types of approaches may be envisaged to achieve this "dynamic conservation", one of them being community-based conservation. Action research has been undertaken within project to look into the potential of local conservation and has brought us some steps further in our understanding of "on-farm conservation". The concluding section of the paper tries to evaluate the significance of the research in a wider political and institutional context, and looks at some policy implications for Irian Jaya.

Introduction

This paper focuses on the relevance of indigenous knowledge (IK) of sweetpotato for local development, specifically in Irian Jaya. Indigenous knowledge is a necessary part of germplasm documentation and also a component of participatory crop breeding strategy.

In terms of research method or approach, this conference stresses "action research", a concept which has been adopted in UPWARD projects. It is assumed that once a participatory approach, is adopted, activities go beyond the gathering of descriptive data and analysis to include other activities which can strengthen local systems of knowledge. In our case, we hope we have made headway in that direction by supporting community-based conservation.

Our project aims to conserve sweetpotato germplasm in Indonesia. This paper presents the project in three parts: the scope and relevance of sweetpotato knowledge among Irian farmers, the discussion of action research (i.e. community conservation), and the significance of this project for rootcrop development in Irian Jaya.

The scope of sweetpotato knowledge among Irian Jaya farmers

Indigenous knowledge of sweetpotato covers a wide scope. It includes:

- *Knowledge needed to identify varieties with distinct names on the basis of morphological traits.* Plants in the field are identified based on the forms of leaves and vines. However, the most important to the users are the roots. To make harvesting easy, the visible parts of the plant have to be associated with specific types of roots. Thus, a sharp perception of morphological diversity is an important tool for farmers, and selection for perceptual difference in varieties is an important factor in the development of varietal diversity (Boster 1985; Schneider 1995).

- *Knowledge of the composition of mixtures.* At the early stage of the project, we hypothesized that variety mixtures are not composed at random, but reflect the need for different types of sweetpotato products (roots and leaves, hog feed and human food). Recently, thesis research was completed by two students from Cenderawasih University, Manokwari that we supported(Yuliantininguish 1995; Nababan 1995). Data on sweetpotato cultivars in three villages, all located in the Baliem valley (Jayawijaya division) of the highlands were collected, using a sample of 30 beds cultivated by 30 different households in each village. Table 1 shows summary data on the varietal diversity in these villages.

Table 1. Varietal diversity in three sample villages.

Village	Waga-Waga	Woogi	Assotipo
# cultivars (cvs) per village	47	41	54
range of # cvs per bed	7-24	5-20	10-23
average # cvs per bed	14	12	17
range of # plants per bed	71-328	54-276	137-305

Source: Yuliantiningsih 1995, Nababan 1995.

The number of cultivars encountered in the total sample varies from 41 to 54. The number of cultivars counted in individual beds is considerably lower ranging from 5 to 24. Some farmers concentrate on the more popular species. Others plant more varieties. Yet, every bed is planted with a mixture; and no bed has been cultivated with just one single variety.

The numerical distribution of varieties on the beds shows that a few popular varieties account for the bulk of the production (Tables 2, 3, and 4). The five most frequently planted varieties make up 64.6% to 77.7% of the total number of plants. The remaining 30 odd varieties are planted only in small numbers. The presence of a relatively high number of residual varieties is a consistent characteristic in all three villages, and has a number of implications for conservation because these varieties are more likely to be affected by varietal change.

The popular cultivars differ from village to village, with two exceptions: *Helaleke* which is a popular cultivar for human consumption, and *Musan,* a cultivar fed to hogs.

Table 2. Popular cultivars in Waga-waga.

Cultivar name	Percentage (%)	Rank	cum %
Helaleke asli	34.9	1	34.9
Musan[a]	15.9	2	50.8
Hopoye	7.8	3	58.6
Helaleke baru	6.4	4	65.0
Hupuk[b]	6.6	5	71.6
Tamue	4.1	6	75.7

Source: Yuliantiningsih 1995.
[a] This variety is cultivated especially for hogs.
[b] This variety is also cultivated for ritual use.

Table 3. Popular cultivars in Woogi.

Cultivar name	Percentage (%)	Rank	cum %
Musan	28.7	1	28.7
Helaleke asli	26.6	2	55.3
Tamue	10.8	3	66.1
Wenaboge	6.6	4	72.7
Helaleke baru	5.0	5	77.7
Tinta	4.1	6	81.8

Source: Yuliantinigsih 1995

Table 4. Popular cultivars in Assotipo.

Cultivar name	Percentage (%)	Rank	cum %
Siate	17.7	1	17.7
Hoboak	12.4	2	30.1
Musaneken	12.3	4	42.4
Helaleke	11.6	5	54.0
Musan[a]	10.6	6	64.6
Abukul[b]	8.7	7	73.3
Yelei	8.1	8	81.4

Source: Nababan 1995
a This variety is cultivated especially for hugs.
b This variety is also cultivated for ritual use.

- *Local knowledge applied to the development of cultivation practices adapted to different environments.*

Two examples of this are as follows:

Farmers in the Kuyawage valley located at more than 2,700 m asl plant on beds without mounds. The farmers are familiar with mounding because this is a common practice in their area of origin. It is notable that because of thin topsoil in their new settlement area they have given it up. Mounding has several important functions. It provides a drier and warmer micro-climate to the sweetpotato crop, and it prevents waterlogging. The mounds should of course consist of fertile topsoil to permit optimal growth. Yet in Kuyawage valley, topsoils are thin, which has forced the farmers to plant directly on the beds.

Another example of successful local knowledge is the practice of turning the vines. Because people practice piecemeal harvest, they want to locate the tubers more easily. The optimal case would be that all tubers are growing in the mounds. In an uncontrolled situation, however, the vines spread in all directions and set roots at the points of leaf insertion, if these points touch the ground. The turning of vines to some extent prevents this because temporarily leaves have no contact points.

- *The symbolic or mythological dimensions of indigenous knowledge.*

To many Irian ethnic groups, sweetpotato is significant not only to the "food system", but also to the symbolic system. As with rice in the western part of Indonesia, sweetpotato is the stuff and staff of life, and the plant has been integrated into local mythology. From the Kurima area (C.A. Widyastuti, personal communication), local Dani lore has it that the bones of their ancestors are buried in a cave near Seima. According to a Dani elder, there are a number of ancient varieties which correspond to the parts of the corpse of this mythical ancestor because these grew out of his body, and the elder was able to name the varieties, one corresponding to the upper arm, another to the head, etc. This concept, relating to the origin of cultigens, appears in different forms in many myths all over Southeast Asia and should, at least, remind us of the large non-technical part of indigenous knowledge.

The relevance of SP knowledge

- In summary, it can be shown that many aspects of IK of sweetpotato are rational and effective tools of farmers in handling the crop. This supports the assumption that this knowledge can be used in the further development of sweetpotato.

- From the perspective of genetic resources, the most relevant part of IK is the ability of farmers to distinguish and manipulate a large set of cultivars. It is the sharp perception and the ability to distinguish which allows cultivators to select the right varieties during harvest and propagate from an existing cultivar inventory. It also allows them to identify and integrate new genotypes with valuable characters.

- Despite this, IK is often not rationalized. Farmers have no satisfactory explanation to the agronomist why they do things but refer only to custom or tradition. This is the gap which needs to be bridged in participatory research.

Community-based conservation: a field for action research

The rationale for community conservation in Jayawijaya, Irian Jaya is the following:

- The example of cultivar mixtures discussed above presents strong evidence for the successful selection of a set of adapted genotypes in the past. Each cultivar is likely to have a complex history, and performs various functions in relation to subsistence needs. This is why it has to be documented and analyzed before social or agricultural changes affect it. In sites selected for benchmark study, it will be possible not only to estimate the pace of varietal change or genetic erosion, but researchers can get a more dynamic understanding of diversity itself.

- The area has high cultivar diversity, one of the criteria in selecting areas for on-farm conservation.

- Good crop management in the traditional system implies curatorship for varietal diversity because only by maintaining a sufficiently large cultivar inventory can the various needs for sweetpotato "products" be satisfied. There seems to be a tendency to satisfy the major needs such as human nutrition and pigfeed, as well as ritual use, with only a few popular varieties. The status of a large number of cultivars planted in small numbers is less clear. The small numbers per cultivar imply that these are the most likely to disappear. But there is no indication that farmers regard them as redundant varieties, nor are they aware of the genetic potential of their continued presence. Thus, there is a need for research on the functional links between crop diversity and management of mixtures.

- The dimension of evaluation or on-farm selection of new material may be added to the traditional knowledge. Local communities need continuous access to this diversity for the future use and development of sweetpotato genetic resources.

Remarks on action research

Exploration of the potential for local conservation through action research began in the Waga-Waga village in 1993. The major objectives were:

- to recover lost varieties (in response to a need expressed by farmers).
- to conduct research on the concept and mechanism of cultivar mixture in a natural setting.
- to strengthen local awareness of conservation of sweetpotato and the importance of this crop in general.
- to enable farmers to select from a segregating population (a recent activity).

Action research can be differentiated from "pure" or "diagnostic" research. "Action" refers to a wider range of activities than simply "interview" or "observation", but also negotiating, paying and exchanging gifts, or participating in a harvest celebration, etc.

Generally, in action research:

- researchers' propositions are discussed with farmers
- more complex transactions exist between the researcher and the farmers (negotiation, gifting, etc.).
- local politics may come into play.
- there is a higher uncertainty about the result of the interaction.
- data generated within the process should include non-technical data, referring to the social context in which the activity takes place.
- there was mutual learning and increased understanding both for researchers and the farmers in Waga-waga.

The significance of the research

From the farmers' point of view:

- The collection itself has no direct short-term benefit for the farmer. Sometimes, however, it highlights the issue of farmers' rights in this context.
- Collection is an opportunity to increase farmers' consciousness of the value of the germplasm.
- On-farm conservation renews the interest in rare varieties with specific traits, and functions as a source for the propagation of planting material.

From the researchers point of view:

- The approximate number of local cultivars in Irian Jaya is not known. The research gives us more precise data on this.
- Genetic diversity can be assessed by a geneticist/breeder.

- Documentation of indigenous knowledge of sweetpotato is a neglected field. Doing it now will provide a point of reference 20 years from now in a probably different stage of development.
- The study of sweetpotato can reveal socio-economic problems because of the important position of sweetpotato in the food system and the overall culture.
- The expected benefits include maintenance of germplasm; improvement of germplasm through breeding activities; and evaluation and selection of new varieties

From the local government perspective:

- some interest in baseline data on sweetpotato coming from the research.
- expected inputs for the solution of problems such as food shortages, natural hazards such as frost which affect sweetpotato production.

The significance of the project depends not only on the successful implementation of components, such as germplasm collection and local conservation, but also on the social and political context in which sweetpotato cultivation takes place.

- To make a rather open conclusion, there are a number of challenges and implications for policy in Irian Jaya.
- How do we "root" rootcrops in local policies?
- How do we find a balance between (necessary) agricultural diversification and the traditional dominance of rootcrops?
- How do we involve farmers in agricultural development?

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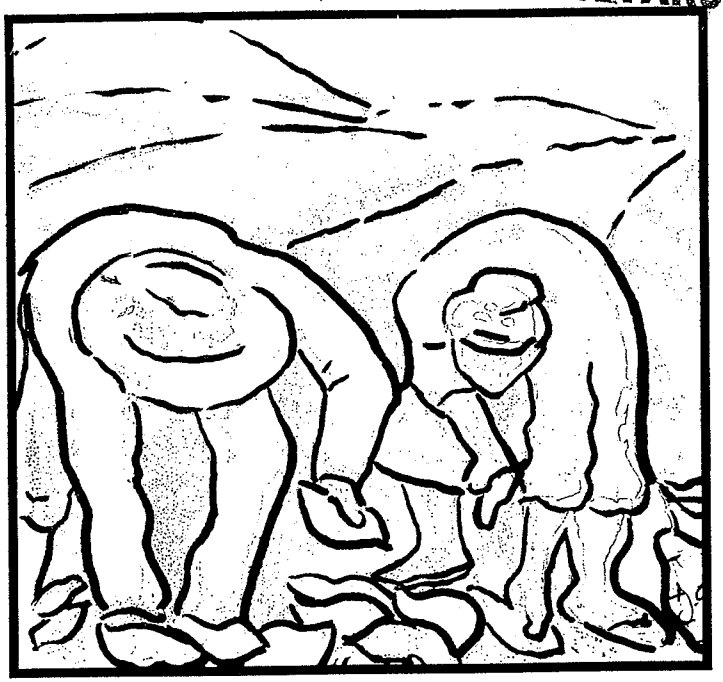

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Contents

SECTION III. ENTERPRISE DEVELOPMENT THROUGH PARTICIPATORY RESEARCH

SECTION IV: DEVELOPMENT AND DIFFUSION OF INNOVATIONS THROUGH INSTITUTIONAL LINKAGES