Indigenous Knowledge and Practice of Nutrient Management of Farmers Growing Sweetpotato in the Uplands of Pinabacdao, Samar

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Summary

Sweetpotato is one of the principal crops grown in Pinabacdao, Samar because of its importance as food for the local people. To many in this town sweetpotato is also a source of income because of its ready market either in the same locality or in other places in Samar or Leyte. For years the production of sweetpotato has been subsistent in nature and this remained so despite of a previous R&D project that had demonstrated new technologies for the production of the crop.

This study aimed at determining if the sweetpotato growers in the locality of Parasanon, Pinabacdao possess certain local knowledge about their soil and crop, particularly sweetpotato. Specifically, the study wanted to (1) validate if sweetpotato growers in the area use degraded uplands for their production of the crop, (2) document and assess local integrated nutrient management (INM) practices for sweetpotato, (3) identify knowledge gaps and other RDE needs of INM for sustainable sweetpotato production, (4) document aspects of similarities/dissimilarities in nutrient management practices between subsistent and semi-commercial/commercial growers of sweetpotato, and (5) document the impact of a former project on sweetpotato technology dissemination on the sweetpotato production practices of local farmers. Informal and formal interviews were the primary methods used in gathering information for the study.

The demographic traits of the farmers clearly differed but they adhered to the same knowledge system regarding the attributes of the soil in their locality and the growth condition of their sweetpotato plants. Using their native dialect, the farmers have a soil classification scheme based on textural characteristics; they have also certain indicators of soil fertility and plant health. Moreover, the farmers know of certain problems concerning their soil or crop but they are not detracted of them because of their experience in finding ways to circumvent the situation.

Generally, the farmers in Pinabacdao do not actually use “truly” degraded uplands for sweetpotato production. Although a number of them have observed new sweetpotato technologies earlier through agricultural technicians and demonstration plots none of the technologies disseminated is being used by them at present.

1 Introduction

1.1 Description of the place and the inhabitants

Pinabacdao is a municipality in Samar (known as Western Samar previously) which is located about 54 km north-west of Tacloban, Leyte and about the same distance to the south of Catbalogan, Samar. Its topography is generally hilly with occasional plain that is mostly traversed by a national highway. Only around 56% of the total land area of the municipality is cultivable. In terms of area planted the main agricultural crops of Pinabacdao on a decreasing hectarage basis are coconut, rootcrops, corn and rice (Dagoy *et al*., 1990). The last of these crops occupies most of the plains while the first the greater part of the hilly areas. The rootcrops constitute of taro, sweetpotato and cassava; taro being the major cash crop, sweetpotato as important supplemental source of food and income and cassava as alternative food. The rootcrops, corn and upland rice are planted in small field patches along hillsides in which the primary soil is clay loam belonging to the Alfisol type.

The soil has very slow permeability, hence, it is highly prone to surface runoff. Cogon (*Imperata cylindrica*) and talahib (*Saccharum spontaneum*) are the predominant grasses that cover most of the uncropped areas in the hills. Shrubs and small trees of various species grow occasionally in clumps especially in the low lying areas where the terrain undulates. The poor soil condition and the apparent lack of proper soil management practices by the farmers in the area could be the main reasons why its soils are generally considered degraded

The study concentrated on the sweetpotato growers living in the vicinity of *Barangay* Parasanon and its adjoining areas who often come to Parasanon during market days. About 75% of the people living in Parasanon including those who sell their farm produce in the same barangay belong to the low income group. Most of them are subsistent farmers who depend largely on hired labor and farm produce for income. Family members including primary school-aged children are the common source of farm labor.

In the early 1990s Parasanon and its adjoining barangays was selected as pilot site of a project entitled "Development of effective technology transfer scheme for appropriate root crop technologies on production, processing and utilization at the community level." The project aimed among others to introduce sweetpotato technology which included newly developed varieties to the local farmers for adoption.

1.2 Objectives of the study

The general objective of the study was to determine whether the sweetpotato growers in the locality of Parasanon, Pinabacdao, Samar possess certain indigenous

knowledge system about the soil and the crop they have and whether they have nutrient management practices for sweetpotato they being traditional growers of the crop. In more specific terms, the following were the objectives of the study:

1. To validate if sweetpotato growers in Pinabacdao, Samar use degraded uplands as sweetpotato production areas.
2. To document and assess local integrated nutrient management (INM) practices for sweetpotato production under hillyland condition.
3. To identify knowledge gaps and other RDE needs of INM for sustainable sweetpotato production under hillyland condition.
4. To document similarities/dissimilarities in nutrient management between subsistent sweetpotato growers of Pinabacdao, Samar and the semi-commercial/commercial growers of Dulag, Leyte.
5. To document the impact of a previous project on sweetpotato technology dissemination on the sweetpotato production of local farmers.

1.3 Selection of the locale and the approach in acquiring information

The research team composed of crop, soil and social science researchers selected Parasanon as the locale of the study for two reasons: (a) it has a very notable record of growing sweetpotato both for household consumption and for the market and, (b) the place was the site of a foreign-funded project on rootcrops technology transfer which impact on the local sweetpotato growing needs to be assessed.

The team visited the locality a number of times and conducted informal and formal interviews and consultations with sweetpotato growing farmers who were the main informants of the study. The first time the farmers were formally met was during a pre-arranged schedule in which the research team surveyed the local knowledge of the farmers concerning soil condition and crop health. Later visits, however, were scheduled during the market day in Parasanon when farmers normally go down to the barangay center from their respective farms to sell their produce. This was done because many of the farmers were not usually available on ordinary days due to their farming preoccupation. Also, a number of them could not be reached ordinarily in their homes due to the substantial distance between their farms and the barangay center. Furthermore, going to distant farms in the locality entailed considerable risk. In fact, direct field observations related to the study were only made on farms not far from the population centers or the national highway.

The formal interview schedule included four main aspects which included the description of the farmer's field, the crops usually planted, the nutrient, and the field

management followed by farmers. Under each of the aspect were sets of specific questions that the farmer respondent had to respond objectively.

2. Characteristics of the sweetpotato growers

2.1 Demographic description

The farmers who contributed information to this study were from 20 to 73 years of age but majority of them were between 40 and 55. They had different educational attainments although most of them were only up to the elementary level. All of them have been into farming for a number of years already when the study was conducted, i.e., 15-53 years to be exact. In fact, for all of them farming was the main source of livelihood. Their association with sweetpotato ranged from 5-53 years although some of them had refrained from growing the crop for sometime because of their shifting priority on the kind of crop they plant on a certain season or year. At present the area that the farmers devote for sweetpotato production range from a garden size of about 100 m^2 to a plantation scale of 2,500 m^2 more or less. Their ability to maintain a larger crop production area depends on the availability of labor including that which comes from the members of the family. For the farmer respondents, the number of children ranged from 0-11 with 16 years as the average age. Majority of the farmers were tenants with only few of them owning the field they toil (Escalada *et al*., 1994).

2.2 Exposure to agricultural technologies

Majority of the farmers involved in the study received direct information about the sweetpotato technologies that were disseminated by the Philippine Root Crop Research and Training Center in ViSCA through the IDRC-funded project that was conducted in the area at an earlier period. Many of them actually received planting materials of the developed sweetpotato varieties at that time whose very high yields they appreciated. However, those that planted the ViSCA varieties did not continue growing them because of the following expressed reasons: (1) the varieties needed to be harvested only once, (2) they could not withstand the long dry period in the area, (3) they required fertilizer and pesticide inputs, (4) they needed to be intensively cleaned of weeds, (5) their roots were wet when cooked, (6) they taste too sweet, (7) they got rotten easily after harvest, and (8) they did not have good market price..

During market days in the locality, when available, the common varieties of sweetpotato for sale are the traditional ones; either *Kaangi* or *Kasapad* plus one or two other indigenous varieties which are already extinct like *Karingkit* or *Inanahaw*. These varieties are preferred by the local people over the newly developed ones because they

produce roots along their vines aside from those in the base of the plants, enabling them to harvest roots a number of times. Besides, these varieties have been proven to be tolerant to drought and diseases and have good eating quality.

2.3 Cropping system

The farmers in the locality of Parasanon do not only grow sweetpotato but other crops as well, whether in association with sweetpotato as an intercrop or as rotation or relay crop. The other crops that are grown predominantly irrespective of the size of the area planted to them are taro, cassava, upland rice, yautia, pineapple, banana and corn. Farmers differed in what they have as major crop; some have upland rice, some others have taro and others still, sweetpotato. There seemed to be no common crop which they considered secondary although a number of them pointed sweetpotato. The farmers also varied in the purpose of growing their primary or secondary crop - either strictly for home consumption, market or both. Many of those who raised crops mainly for home consumption, nevertheless, sold whatever they had as excess of the household need. Meanwhile, those that had premeditated aim to sell part of their produce refrained from selling anything when their harvest was short of the family's need. These facts indicate that farmers in Pinabacdao actually cultivate crops basically for household needs and the other purpose they may have in raising crops is highly dependent on the outcome of their primary intention.

Majority of the farmer informants claimed to follow a crop-fallow-crop cycle of farming although some practice continuous cropping system. The truth, however, is that all of them practice the same thing. What is usually done is that they clear an area from natural vegetations and then plant it with a certain crop or crops in a mixed stand. If they sense that the soil is still capable of supporting favorable growth they replant the same area. They do the same thing until the growth of the crop becomes clearly impaired due to lack of nutrients. Once this is observed they leave the field for it to be recovered by natural stand of grasses, bushes and trees. As far as the local farmers were concerned fallowing normally takes three to seven years before the land is again reclaimed for cultivation.

3. Farmers' indigenous knowledge about their soil and crop

3.1 Soil classification, fertility and slope

The farmers in the locality of Parasanon have their own knowledge system about various aspects of the soil; classification, fertility and topography. In fact, their indigenous knowledge related to the soil is implanted in the local *waray* dialect which contain specific

classificatory or descriptive terms like *barason* for sandy, *batohon* for stony, *patag* for plain, etc.

The local classification used by the farmer informants for their soils is mainly based on the soil texture as presented in Table 1. With this classification system, the farmers could well indicate likewise where the particular kind of soil is specifically located in their locality and the inherent characteristics particular to the said kind of soil.

Because of the absence of a better kind of soil such as loam or sandy loam and the inadequacy of *barason* areas, which is the best alternative in the locality of Parasanon, crop production is commonly done in the hillsides where the soil is generally clayey. The lack of adequate vegetation cover in many of the cultivated hillsides promoted erosion and turned the fields into stony patches as a result of the removal of the top soil and the subsequent outcropping of the stones usually present in the subsoil. Despite this local farmers did not seemed to be disturbed by the erosion problem although they are aware of its consequences on the general productivity of their fields.

The prevalent concept of soil fertility given by the farmers during the survey was that the farmlands near the barangay or center of population are generally poor in nutrient content because of overuse, whereas, those that are farther away inland are fertile because the lands are seldom used for crops.

Table 1. Ethnological classification of the soil by the farmers growing sweetpotato in the locality of Parasanon, Pinabacdao, Samar.

Classification	**Specific Location**	**General Characteristic/Description**
Barason (Sandy)	Riverside	Encourage good growth of any crop.
Batohon (Stony, gravely)	Near river or slopes	Top soil is shallow. Stony subsoil. Any crop planted in it wilt after a short dry spell.
Galot (Clay)	Hillside or plain	Hard. Sticky/slippery when wet. Friable when dry.

The farmers atributed the rehabilitation of a fallowed field to the organic matter that comes from fallen leaves and other plant materials that decompose on the ground. It was a widespread belief among the farmer informants that leaving the field for a few years enable the soil to accumulate organic matter and thus, its ability to support luxuriant growth of crops is restored. Some of the farmers were quick to underscore, however, that

accumulation of organic matter is not promoted by just any kind of vegetation growing over a certain field. Cogon and talahib were considered poor in contributing organic matter to the soil while shrubs and trees are good depositors of the same.

The indicators of soil fertility followed by the farmers in the locality included soil color, texture and the kind of vegetation growing in the field (Table 2). Under any of these indicators the farmers appeared well versed in differentiating a fertile soil from an infertile one by merely describing them generally. Furthermore, the local farmers could promptly point out the causes why a certain soil possess a particular color or textural characteristics.

Table 2. Local indicators of soil fertility and the characteristic associated with the fertile or infertile soil.

Indicator	**General description**	
	Fertile soil	**Infertile soil**
Color	Blackish; Dark brown	Pale brown; Reddish
Texture	Fine	Coarse; Hard
Vegetation	Mixed stand of different species; Combination of shrubs, trees and vines	Predominantly cogon or talahib

The dark color associated with fertile soil is attributed by the local farmers to the presence of decayed plant materials; the darker the soil color the more organic matter it contains and the richer it is for plant growth. The farmers believed also that it is the organic matter that makes naturally hard soil brittle and friable. They also have in their ideas that reddening of a soil is not only an indication of its poor nutrient content but of heavy erosion as well.

With regards to the local concept of the topography of their fields, the farmers had in mind the slope of the soil they termed *kabakilid*. Having the flat or plain ground as their basis, they classify the slope of their lands using definitive local terms with their corresponding description for each classification (Table 3). It was through the description given by the farmers that the sloppiness of their lands were determined by the researchers. The suggested percentage slope for each of their local classification was noted by the farmers themselves to be the actual slope of their field.

There was a common understanding among the farmers that soils under any degree of slope except that of the plain are subject to erosion, commonly by heavy rain. The presence of soil deposits (*agan-an*) at the base of a slope, the outcropping or protrusion of rocks or stones on the soil surface and cracking of the soil were the key indicators of soil

erosion given. They generally attributed soil erosion in their fields to two factors, namely; the lack or absence of trees and other vegetative cover on the hilltops and hillsides, and heavy rainfall in the area especially during the rainy season.

Table 3. Classification of the slope of the land by farmers using local terminologies.

Slope classification	**Description**	**Percent slope**
Patag	Plain; flat	~ 0 - 5
Anay-ay	Undulating	~ 6 - 10
Higad-higad	Rolling	~ 15 - 50
Higad	Steep	> 50

Although it was widely regarded that erosion contributes to soil degradation and eventual loss of soil fertility, the farmers generally did not seemed to be bothered by the problem. In fact, none among them had adopted the technology of planting vetiver or other grasses along the contour of their fields as had been shown to them in demonstration plots of the project mentioned earlier. Their lack of concern to maintain the integrity of their soil, i.e., to check soil erosion for example, is largely due to the fact that they could easily transfer and relocate their farms to other areas in the same locality. In moving out from their degraded fields the farmers either open new areas or go back to his previously cropped area that have been already rehabilitated by natural vegetations after some years of fallowing. This practice of opening new lands for farming every now and then may have contributed to the shrinking of the forest in Samar. One farmers, in fact, had a farm about five or seven kilometers because unused lands are those that are farther away from the population centers.

Concerning soil erosion control, a farmer who did not like to relocate his farm to a more distant site showed regard for his soil, in that, he checked or control soil erosion by lining up banana stalks across the slope of his field during the rainy season.

It could be deduced from the information gathered that local farmers generally do no have initiative to protect and preserve their soil resource basically on the reason that unclaimed uncropped areas are available anytime notwithstanding the distance from the population center. Furthermore, the information suggest that the technology using contour planting of deep rooted grasses to control soil erosion was not adopted by the local farmers for long. The technology was only good when the technology dissemination project was still enforced.

3.2 Crop health

When inquired about their idea of crop health, plant growth (*tubo hiton tanum*) was the immediate picture the farmers can give. In the plant itself a number of indicators were identified such that by plainly examining them a farmer, according to the informants, could readily conclude whether a plant is healthy or not. The common distinguishing characters of a healthy and unhealthy plant under the indicators given is presented in Table 4, together with the perceived causes of plant unhealthiness.

Table 4. Indicators of crop health and the main distinguishing characters of a healthy and unhealthy plant under each indicator.

Indicator	**Healthy crop**	**Unhealthy crop**	**Perceived cause**
Leaf color	Dark green	Yellowish	Lack of nutrient
Leaf size	Large; thick	Small; thin	Lack of nutrient
Rate of growth	Fast	Slow; stunted	Lack of nutrient
Storage root size	Mostly large	Mostly small	Lack of nutrient
Presence of pests	Usually more	Usually less	Succulence of leaves

The common solution locally practiced by the farmers in Parasanon to mitigate poor crop health was leaving or abandoning (fallow) the area and have it revegetated by trees and other naturally growing plant species. The number of years of fallow for a field normally ranged from 4 -7 years after which it is again utilized by cutting down first all existing trees and other vegetations. However, instead of leaving the field, other farmers, changed their crop and planted either banana, peanut, pineapple or cassava. It was a general opinion of the farmer informants that continuous planting of sweetpotato on the same field result in a decline of growth and yield. The farmers, however, pointed to loss of soil nutrient as the possible cause of poor crop growth. The idea of allelopathy which is true in sweetpotato (Pardales, 1993) was not known to any of the farmers.

3.3 Sweetpotato as a crop

The farmers' popular idea about sweetpotato as a crop in terms of its relationship with the soil is that it prevents erosion of the soil even during heavy rains.. This observation was accurate from the researchers' point of view because the traditional varieties that the farmers were commonly planting had viny stature such that they cover the ground well and soften the impact of rains and check water run-off.

The thought that sweetpotato is a soil nutrient depleting crop had never entered the mind of the local growers of the crop. In fact, they claimed that if it were true they would still never considered it as a problem primarily because it is seldom that they plant sweetpotato after the same crop in the same area. As far as the farmers' experience is concerned their reason for not planting sweetpotato in succession are twofold: (1) the roots of the succeeding sweetpotato crop do not grow big, and (2) the roots of the following crop cannot be eaten nor sold due to sweetpotato weevil infestation. The second reason is especially true if the harvest of the second crop happen during the dry season.

The farmers considered soil management and crop health as critical factors for sweetpotato or any of their crops for that matter. Nevertheless, they claimed that they do not mind practicing or maintaining any of the practices related to these because of the fact that their production is only small scale. The farmers showed more interest in managing their soil well and improving plant health only if they grow the crop in a semi-commercial or commercial scale and when they put capital investment on it, like what they do with corn or other cash crops.

The farmers did not have specific soil management and crop health problem with regards to their sweetpotato planting. Nevertheless, they expressed their willingness to collaborate or cooperate with researchers on whatever activity that needs to be done to improve the production of their crop.

4 Local practices related to nutrient management for sweetpotato

4.1 Use of commercial fertilizer

All the farmer informants indicated that soil fertility is important because it makes sweetpotato grow well and give good yield. In fact, many of them have seen how the crop grows under a well-fertilized condition in the demonstration plots established by the technology dissemination project mentioned earlier. However, none among the farmer respondents used any kind of commercial fertilizer for sweetpotato. They also pointed out that they do not have any specific practice that could be considered to improve or maintain soil fertility although they fully know that lack of nutrients in the soil is a problem. The reasons given for not using fertilizer on sweetpotato were either that (1) they have no money for buying fertilizer, (2) fertilization is not necessary since their field can still sustain good crop growth, (3) they could easily relocate their farms in a better soil if their sweetpotato growth becomes poor; (4) fertilization is not practical because their sweetpotato production is only small scale, or (5) it is difficult to transport fertilizer to their field which is very far from the barangay center or the highway.

Nobody among the informants use animal manure as fertilizer. This is primarily because there is not much supply of it locally. Although the farmers do not normally use animal manure it is a belief of some of them that animal manure is a source of certain

diseases that infect sweetpotato. Others considered it unsanitary to use them for crop production.

4.2 Integrated nutrient management practice

From the interviews, there is nothing that the researchers found from the respondents that could be directly considered as an integrated nutrient management practice for sweetpotato or for any crop. Indirectly, however, the only thing that could be taken into account as an INM strategy by the farmers for sweetpotato is leaving the uprooted weeds at weeding time scattered on the surface of the ground to let it decay and be incorporated consequently into the soil. For some of them the practice was to heap the weed-out grasses around the planting mound. At harvest the sweetpotato vines were also left on the ground to decay. Strictly speaking, the fact that farmers do not normally plant sweetpotato over the same area in succession makes the purpose of letting weeds and plant materials decompose and affect nutrient recycling of no advantage to sweetpotato or any crop.

4.3 Experience of farmers growing sweetpotato in semi-commercial or commercial scale

Information gathered from the farmers growing sweetpotato in semi-commercial or commercial scale in Dulag and Julieta towns in Leyte showed that unless financial assistance is received for sweetpotato production they do not use any kind of fertilizer. Local farmers claimed that their soil is fertile and to maintain the nutrient status of their soil they turn under the vines and leaves of the previous sweetpotato crop together with the weeds. Carabao-drawn plow is used to do this. It appears that green manuring is the main INM practice by the sweetpotato-growing farmers in the locality of Dulag and Julieta, Leyte. Unlike the farmers in Parasanon, those in Dulag and Julieta plant sweetpotato successively but only up to two or three croppings, afterwhich they shift to corn or peanuts. Similarly, they observed decline in yield if they plant the crop many times over the same area. It is highly suspected that allelopathy is the cause, only that the problem is not serious because of the sandy loam texture of the soil in the Dulag and Julieta areas. One of us (Pardales, 1993) found that the allelopathic nature of sweetpotato can be lost over time largely due to leaching during rains. This process takes place easily if the soil texture is sandy, hence, the ability of the Dulag or Julieta farmers to plant sweetpotato a number of times over the same soil unlike those in Parasanon who have clay soils.

4.3 Main problem in sweetpotato production

For the farmers in Parasanon, their main problem was lack of financial resource for labor to keep their sweetpotato field weed free. Since the family members were the main provider of labor the father or head of the family tilled only certain area of land that the family could help maintain, especially the control of weeds. Almost all of the farmer informants had their respective wife helped them in some farms chores. The ordinary work for the wives were planting, weeding and harvesting. Among these activities, the farmer husbands saw weeding as the most demanding for their wives or children.

5. Conclusion

The farmers growing sweetpotato in Parasanon, Pinabacdao, Samar possess a local knowledge system with regards to the nature of the soil and that of their sweetpotato crop. Although they are well aware of the effect of certain unfavorable soil or crop condition like the sloppiness of their field (which favor soil erosion) or the fertility condition of their soil (which needs to be improved or maintained) the farmers are not disturbed because of the fact that they could readily open a new land and use it for crop production. It follows therefore, that the farmers in Pinabacdao do not actually use degraded areas for sweetpotato production. This clearly suggests that the population of the locality does not impose pressure yet on the land.

Technologies on sweetpotato production demonstrated before them under a previous project did not have long lasting application on the part of the local farmers, including the high yielding sweetpotato varieties. This could be due to some incompatibilities between the researchers' ideas that guided them in developing the technology and the farmers' expectation of the technology. The case in point for this would be the newly developed varieties which were hoped to be adopted by the farmers. Concerning soil and crop management like the use of contour plants to check soil erosion, the reason for non-adoption could be a blend of resource unavailability and attitudinal.

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