Farm in Matalom, Leyte with corn (already harvested) and relayed sweet potato (Engr. Jemar G. Raquid (Bureau of Soils and Water Management))

Sweet Potato Relay Cropping (Philippines)

Lapat System

DESCRIPTION

A farmer's indigenous practice of growing sweet potato as a relay crop to its main crop of either rice or corn.

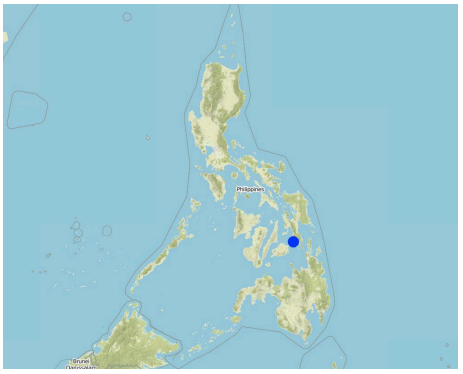
It is the planting of sweet potato together with rice/corn on the same area, hence, maximizing the area for crop production. Specifically, a local sweet potato variety called "mayaman" is planted one to two months after planting rice/corn and is being cultivated in the field in between the rows of the above-mentioned main crop. The "mayaman" variety is selected by the farmers due to its excellent food quality and ability to produce more roots at its vine, enabling staggered harvesting and extending period of utilization. However, in some instances, rice and corn were planted at the same time.

Purpose of the Technology: The main purpose of using creeping type of sweet potato is to provide cover to the soil which addresses soil moisture conservation primarily during growing period and after main crop harvesting time. It also protects the soil against erosion. Moreover, it provides additional and alternative food source for the farmers, in case the main crop fails due to some reasons.

Establishment / maintenance activities and inputs: The main crop, either corn or rice, is planted first with a specified planting distance--75cm between rows and 75cm between hills with 2 to 3 seeds per hill (for corn) and 30cm between rows and 20cm between hills with 5 to 6 seeds per hill (for rice). After one month, the sweet potato cuttings are planted in between rows of the main crop at a distance of 1.5m between hills.

Natural / human environment: This relay cropping system is locally known as "lapat" in the areas of Matalom and Bato, Southern Leyte where it is commonly practiced.The soil in these areas is characterized as mostly acid soil. Whereas, its topography is generally comprises from rolling to steep hills. In terms of climate, rainfall is more or less evenly distributed throughout the year and typhoons usually occur during the months of October or November. In addition, most of local farmers cultivated 1 to 2 parcels with farm size from 0.12 to 5.95 hectares with farming as the principal source of livelihood and income. The fields ot the farms are basically rainfed because it is totally dependent on rainfall as water supply for irrigation.

LOCATION



Location: Matalom, Southern Leyte, Philippines

No. of Technology sites analysed:

Geo-reference of selected sites
- 124.7965, 10.28741

Spread of the Technology: evenly spread over an area (approx. < 0.1 km2 (10 ha))

In a permanently protected area?:

Date of implementation: more than 50 years ago (traditional)

Type of introduction
- [ ] through land users' innovation
- [x] as part of a traditional system (> 50 years)
- [ ] during experiments/ research
- [ ] through projects/ external interventions

sweet potato grown in between rows of corn (Engr. Jemar G. Raquid (Bureau of Soils and Water Management))

CLASSIFICATION OF THE TECHNOLOGY

Main purpose

- [ ] improve production
- [ ] reduce, prevent, restore land degradation
- [ ] conserve ecosystem
- [ ] protect a watershed/ downstream areas – in combination with other Technologies
- [ ] preserve/ improve biodiversity
- [ ] reduce risk of disasters
- [ ] adapt to climate change/ extremes and its impacts
- [ ] mitigate climate change and its impacts
- [ ] create beneficial economic impact
- [ ] create beneficial social impact

Land use

Cropland

- Annual cropping: cereals - maize, root/tuber crops - sweet potatoes, yams, taro/cocoyam, other, rice

Number of growing seasons per year: 2

Water supply

- [x] rainfed
- [ ] mixed rainfed-irrigated
- [ ] full irrigation

Purpose related to land degradation

- [ ] prevent land degradation
- [x] reduce land degradation
- [ ] restore/ rehabilitate severely degraded land
- [ ] adapt to land degradation
- [ ] not applicable

Degradation addressed

soil erosion by water - Wt: loss of topsoil/ surface erosion

physical soil deterioration - Pc: compaction

biological degradation - Bc: reduction of vegetation cover

water degradation - Ha: aridification

SLM group

- rotational systems (crop rotation, fallows, shifting cultivation)
- improved ground/ vegetation cover
- Intercropping

SLM measures

agronomic measures - A1: Vegetation/ soil cover, A3: Soil surface treatment

TECHNICAL DRAWING

Technical specifications

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs

- Costs are calculated:
- Currency used for cost calculation: **n.a.**
- Exchange rate (to USD): 1 USD = 45.0
- Average wage cost of hired labour per day: n.a

Most important factors affecting the costs

n.a.

Establishment activities

n.a.

Establishment inputs and costs

Specify input	Unit	Quantity	Costs per Unit (n.a.)	Total costs per input (n.a.)	% of costs borne by land users
Plant material					
Corn seeds	kg	2.0	0.78	1.56	100.0
Rice seeds	kg	43.2	0.7777777	33.6	100.0
Sweet potato	cuttings	13000.0	0.00555555	72.22	100.0
Total costs for establishment of the Technology				**107.38**	
Total costs for establishment of the Technology in USD				*2.39*	

Maintenance activities

1. clearing (Timing/ frequency: March)
2. plowing (Timing/ frequency: 10 days after clearing)
3. harrowing (Timing/ frequency: after plowing)
4. furrowing (Timing/ frequency: after harrowing)
5. planting of rice (Timing/ frequency: April)
6. planting of corn (Timing/ frequency: 2 weeks after planting rice)
7. planting of sweet potato (Timing/ frequency: 2 months after planting corn)
8. weeding (Timing/ frequency: every month)
9. spraying (Timing/ frequency: three times before harversting)
10. harvesting of rice and corn (Timing/ frequency: None)

Maintenance inputs and costs

Specify input	Unit	Quantity	Costs per Unit (n.a.)	Total costs per input (n.a.)	% of costs borne by land users
Labour					
Labour	ha	1.0	391.5	391.5	100.0
Total costs for maintenance of the Technology				**391.5**	
Total costs for maintenance of the Technology in USD				*8.7*	

NATURAL ENVIRONMENT

Average annual rainfall

- [ ] < 250 mm
- [ ] 251-500 mm
- [ ] 501-750 mm
- [ ] 751-1,000 mm
- [ ] 1,001-1,500 mm
- [ ] 1,501-2,000 mm
- [x] 2,001-3,000 mm
- [ ] 3,001-4,000 mm
- [ ] > 4,000 mm

Agro-climatic zone

- [x] humid
- [ ] sub-humid
- [ ] semi-arid
- [ ] arid

Specifications on climate

Thermal climate class: tropics

Slope

- [ ] flat (0-2%)
- [ ] gentle (3-5%)
- [ ] moderate (6-10%)
- [x] rolling (11-15%)
- [x] hilly (16-30%)
- [ ] steep (31-60%)
- [ ] very steep (>60%)

Landforms

- [ ] plateau/plains
- [ ] ridges
- [x] mountain slopes
- [x] hill slopes
- [ ] footslopes
- [ ] valley floors

Altitude

- [ ] 0-100 m a.s.l.
- [x] 101-500 m a.s.l.
- [ ] 501-1,000 m a.s.l.
- [ ] 1,001-1,500 m a.s.l.
- [ ] 1,501-2,000 m a.s.l.
- [ ] 2,001-2,500 m a.s.l.
- [ ] 2,501-3,000 m a.s.l.
- [ ] 3,001-4,000 m a.s.l.
- [ ] > 4,000 m a.s.l.

Technology is applied in

- [ ] convex situations
- [ ] concave situations
- [ ] not relevant

Soil depth

- [ ] very shallow (0-20 cm)
- [x] shallow (21-50 cm)
- [ ] moderately deep (51-80 cm)
- [ ] deep (81-120 cm)
- [ ] very deep (> 120 cm)

Soil texture (topsoil)

- [ ] coarse/ light (sandy)
- [x] medium (loamy, silty)
- [ ] fine/ heavy (clay)

Soil texture (> 20 cm below surface)

- [ ] coarse/ light (sandy)
- [ ] medium (loamy, silty)
- [ ] fine/ heavy (clay)

Topsoil organic matter content

- [ ] high (>3%)
- [x] medium (1-3%)
- [ ] low (<1%)

Groundwater table

- [ ] on surface
- [ ] < 5 m
- [x] 5-50 m
- [ ] > 50 m

Availability of surface water

- [ ] excess
- [ ] good
- [x] medium
- [ ] poor/ none

Water quality (untreated)

- [x] good drinking water
- [ ] poor drinking water (treatment required)
- [ ] for agricultural use only (irrigation)
- [ ] unusable

Water quality refers to:

Is salinity a problem?

- [ ] Yes
- [ ] No

Occurrence of flooding

- [ ] Yes
- [ ] No

Species diversity
- [ ] high
- [ ] medium
- [x] low

Habitat diversity
- [ ] high
- [ ] medium
- [ ] low

CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

Market orientation
- [x] subsistence (self-supply)
- [ ] mixed (subsistence/ commercial)
- [ ] commercial/ market

Off-farm income
- [x] less than 10% of all income
- [ ] 10-50% of all income
- [ ] > 50% of all income

Relative level of wealth
- [ ] very poor
- [ ] poor
- [x] average
- [ ] rich
- [ ] very rich

Level of mechanization
- [x] manual work
- [x] animal traction
- [ ] mechanized/ motorized

Sedentary or nomadic
- [ ] Sedentary
- [ ] Semi-nomadic
- [ ] Nomadic

Individuals or groups
- [x] individual/ household
- [ ] groups/ community
- [ ] cooperative
- [ ] employee (company, government)

Gender
- [x] women
- [x] men

Age
- [ ] children
- [ ] youth
- [ ] middle-aged
- [ ] elderly

Area used per household
- [ ] < 0.5 ha
- [x] 0.5-1 ha
- [ ] 1-2 ha
- [ ] 2-5 ha
- [ ] 5-15 ha
- [ ] 15-50 ha
- [ ] 50-100 ha
- [ ] 100-500 ha
- [ ] 500-1,000 ha
- [ ] 1,000-10,000 ha
- [ ] > 10,000 ha

Scale
- [x] small-scale
- [ ] medium-scale
- [ ] large-scale

Land ownership
- [ ] state
- [ ] company
- [ ] communal/ village
- [ ] group
- [ ] individual, not titled
- [ ] individual, titled
- [x] mixed land ownership

Land use rights
- [ ] open access (unorganized)
- [ ] communal (organized)
- [x] leased
- [x] individual

Water use rights
- [x] open access (unorganized)
- [ ] communal (organized)
- [ ] leased
- [ ] individual

Access to services and infrastructure

health	poor ✓	good
education	poor ✓	good
technical assistance	poor ✓	good
employment (e.g. off-farm)	poor ✓	good
markets	poor ✓	good
energy	poor ✓	good
roads and transport	poor ✓	good
drinking water and sanitation	poor ✓	good
financial services	poor ✓	good

IMPACTS

Socio-economic impacts

farm income	decreased ✓	increased
diversity of income sources	decreased ✓	increased
workload	increased ✓	decreased

less weeding needed since sweet potato served also as cover crop

Socio-cultural impacts

food security/ self-sufficiency	reduced ✓	improved
conflict mitigation	worsened ✓	improved

Ecological impacts

evaporation	increased ✓	decreased
soil moisture	decreased ✓	increased
soil cover	reduced ✓	improved
soil loss	increased ✓	decreased
soil organic matter/ below ground C	decreased ✓	increased
emission of carbon and greenhouse gases	increased ✓	decreased

Off-site impacts

COST-BENEFIT ANALYSIS

Benefits compared with establishment costs

Short-term returns	very negative ✓	very positive
Long-term returns	very negative ✓	very positive

Benefits compared with maintenance costs

Short-term returns: very negative ✓ very positive

Long-term returns: very negative ✓ very positive

CLIMATE CHANGE

Gradual climate change

annual temperature increase: not well at all ✓ very well

Climate-related extremes (disasters)

drought: not well at all ✓ very well

ADOPTION AND ADAPTATION

Percentage of land users in the area who have adopted the Technology

- single cases/ experimental
- 1-10%
- 11-50%
- > 50%

Of all those who have adopted the Technology, how many have done so without receiving material incentives?

- 0-10%
- 11-50%
- 51-90%
- ✓ 91-100%

Has the Technology been modified recently to adapt to changing conditions?

- Yes
- No

To which changing conditions?

- climatic change/ extremes
- changing markets
- labour availability (e.g. due to migration)

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view

Strengths: compiler's or other key resource person's view

- Simplicity of the farming practice with minimal external input requirement

  How can they be sustained / enhanced? improvement in terms of planting distance or in the land preparation activity; look for other potential cover crop aside from sweet potato
- Enhance Soil moisture conservation

  How can they be sustained / enhanced? conduct research study to have a more scientific basis
- Additional food source and farm income

  How can they be sustained / enhanced? integration of other suitable crops for diversification; consider possible value-adding activity; help in the marketing of the product
- Soil protection against erosion

  How can they be sustained / enhanced? Practice contouring and other soil conservation measures in the hilly land/sloping production areas to further minimize soil erosion

Weaknesses/ disadvantages/ risks: land user's viewhow to overcome

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's viewhow to overcome

- Low market price for sweet potato Value adding through post-harvest processing of sweet potato;Livelihood development related to sweet potato post-harvest processing

REFERENCES

Compiler
Philippine Overview of Conservation Approaches and Technologies

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Full description in the WOCAT database
https://qcat.wocat.net/en/wocat/technologies/view/technologies_1301/

Linked SLM data
n.a.

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