



Sweet Potato Relay Cropping Philippines - Lapat System

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.

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.

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.

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 of the farms are basically rainfed because it is totally dependent on rainfall as water supply for irrigation.

left: Farm in Matalom, Leyte with corn (already harvested) and relayed sweet potato (Photo: Engr. Jemar G. Raquid)
right: sweet potato grown in between rows of corn (Photo: Engr. Jemar G. Raquid)

Location: Matalom, Southern Leyte

Technology area: < 0.1 km² (10 ha)

Conservation measure: agronomic

Stage of intervention: mitigation / reduction of land degradation

Origin: Developed through land user's initiative, traditional (>50 years ago)

Land use type:

Cropland: Annual cropping

Climate: humid, tropics

WOCAT database reference:

T_PHI061en

Related approach:

Compiled by: Philippine Overview of Conservation Approaches and Technologies, Bureau of Soils and Water Management

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Classification

Land use problems:

- soil erosion, soil moisture (expert's point of view)
- soil erosion (land user's point of view)

Land use



Annual cropping
rainfed

Climate



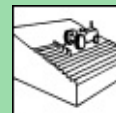
humid

Degradation






Soil erosion by water: loss of topsoil / surface erosion,
Biological degradation: reduction of vegetation cover

Conservation measure



Agronomic: Soil surface treatment
Agronomic: Vegetation/soil cover

Stage of intervention	Origin	Level of technical knowledge
 <ul style="list-style-type: none"> Prevention Mitigation / Reduction Rehabilitation 	 <ul style="list-style-type: none"> Land users initiative: traditional (>50 years ago) Experiments / Research Externally introduced 	 <ul style="list-style-type: none"> Agricultural advisor Land user

Main causes of land degradation:
 Direct causes - Human induced: soil management
 Direct causes - Natural: other natural causes, topography

Main technical functions:





- control of raindrop splash
- improvement of ground cover

Secondary technical functions:


- improvement of topsoil structure (compaction)
- increase of infiltration
- increase / maintain water stored in soil
- increase of biomass (quantity)

Environment

Natural Environment


Average annual rainfall (mm)	Altitude (m a.s.l.)	Landform	Slope (%)
 <ul style="list-style-type: none"> > 4000 mm 3000-4000 mm 2000-3000 mm 1500-2000 mm 1000-1500 mm 750-1000 mm 500-750 mm 250-500 mm < 250 mm 	 <ul style="list-style-type: none"> > 4000 3000-4000 2500-3000 2000-2500 1500-2000 1000-1500 500-1000 100-500 < 100 	 <ul style="list-style-type: none"> plateau / plains ridges mountain slopes hill slopes footslopes valley floors 	 <ul style="list-style-type: none"> flat gentle moderate rolling hilly steep very steep

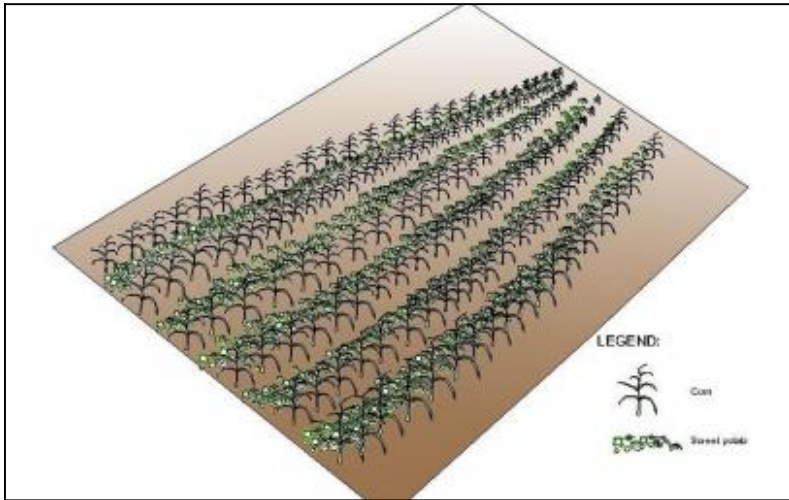
Soil depth (cm)

 <ul style="list-style-type: none"> 0-20 20-50 50-80 80-120 >120 	<p>Soil texture: medium (loam) Soil fertility: medium Topsoil organic matter: medium (1-3%) Soil drainage/infiltration: medium</p>	<p>Soil water storage capacity: medium Ground water table: 5 - 50 m Availability of surface water: medium Water quality: good drinking water Biodiversity: low</p>
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Tolerant of climatic extremes: droughts / dry spells
Sensitive to climatic extremes: temperature increase

Human Environment

Cropland per household (ha)	Land user: Individual / household, Small scale land users, common / average land users, men and women	Importance of off-farm income: less than 10% of all income:
 <ul style="list-style-type: none"> <0.5 0.5-1 1-2 2-5 5-15 15-50 50-100 100-500 500-1,000 1,000-10,000 >10,000 	<p>Population density: 200-500 persons/km² Annual population growth: < 0.5% Land ownership: mixed land ownership Land use rights: individual Water use rights: open access (unorganised) Relative level of wealth: average</p>	<p>Access to service and infrastructure: moderate: health, education, technical assistance, employment (eg off-farm), market, energy, roads & transport, drinking water and sanitation, financial services Market orientation: subsistence (self-supply) Mechanization: manual labour Livestock grazing on cropland:</p>



Technical drawing

Sweet potato and corn planted within an area (Patricio A. Yambot)

Implementation activities, inputs and costs

Establishment activities

- corn seeds, kg
- rice seeds, kg
- sweet potato cuttings

Establishment inputs and costs per ha

Inputs	Costs (US\$)	% met by land user
Agricultural		
- seeds	107.38	100%
TOTAL	107.38	100.00%

Maintenance/recurrent activities

- furrowing
- weeding
- spraying
- planting of rice
- planting of corn
- harvesting of rice and corn
- plowing
- clearing
- harrowing
- planting of sweet potato

Maintenance/recurrent inputs and costs per ha per year

Inputs	Costs (US\$)	% met by land user
Labour	391.50	100%
Agricultural		
- insecticides	11.11	100%
TOTAL	402.61	100.00%

Remarks:

Assessment

Impacts of the Technology	
<p>Production and socio-economic benefits</p> <ul style="list-style-type: none"> +++ diversification of income sources ++ increased farm income + decreased workload 	<p>Production and socio-economic disadvantages</p>
<p>Socio-cultural benefits</p> <ul style="list-style-type: none"> +++ improved food security / self sufficiency ++ improved conservation / erosion knowledge 	<p>Socio-cultural disadvantages</p>
<p>Ecological benefits</p> <ul style="list-style-type: none"> +++ reduced evaporation +++ improved soil cover ++ increased soil moisture + increased soil organic matter / below ground C + reduced emission of carbon and greenhouse gases + reduced soil loss 	<p>Ecological disadvantages</p>
<p>Off-site benefits</p>	<p>Off-site disadvantages</p>
<p>Contribution to human well-being / livelihoods</p>	

Benefits /costs according to land user

Benefits compared with costs	short-term:	long-term:
Establishment	slightly positive	neutral / balanced
Maintenance / recurrent	slightly positive	neutral / balanced

Acceptance / adoption:

0% of land user families have implemented the technology with external material support.

100% of land user families have implemented the technology voluntary.

There is little trend towards (growing) spontaneous adoption of the technology.

Concluding statements

Strengths and → how to sustain/improve

Simplicity of the farming practice with minimal external input requirement → 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 → conduct research study to have a more scientific basis

Additional food source and farm income → integration of other suitable crops for diversification; consider possible value-adding activity; help in the marketing of the product

Soil protection against erosion → Practice contouring and other soil conservation measures in the hilly land/sloping production areas to further minimize soil erosion

not known →

Weaknesses and → how 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

not known →



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