Promotion of Sesbania species (as green manures for rice cultivation) (Nepal)
Dhaincha Prabardhan

**DESCRIPTION**

Green manure-It is a way of adding nutrients and organic matters to soil by incorporating green manure plants which include both leguminous or non-leguminous plants. Sesbania, also known as Daincha, i.e. a diverse and versatile genus belonging to the family Fabaceae, which is soft, woody, annual or short lived perennial; primarily used as green manure between rice crops or as an intercrop in transplanted rice.

Aims / objectives: -Leguminous green plants like Sesbania can fix atmospheric nitrogen in the form that plant can use.
-It helps to improve the soil structure as incorporating it into the soil adds organic matter (biomass).
-The Sesbania species has high water-logging tolerance which prevents the crop from losing its nutrient content.

Methods: In nepal, institutions like NARC and research programs like Rice Research program has actively promoted Sesbania species. Dr. Bholman Singh Basnet of Nepal Agriculture Research council (NARC), Khumaltar has extensively carried out his research on green manure using Sesbania, which is called locally as Daincha.

The Hardinath Agriculture Farm in Dhanusha, now National Rice Research Program, practiced Sesbania cannabina, daincha as pre-rice manure annually in 20 ha for more than 20 years.

Green manure technique is an indigenous practice mainly in the foothills, middle mountains region and central terai of nepal-dhanusha, Parsa, bara and Rautahat district.

Stages of implementation: Sesbania is sown before rice is planted. Sow the Sesbania seed densely and lightly cover the seed with soil. Sesbania will grow faster if the soil is kept moist. After 4-6 weeks sesbania will be 18-36 inches tall at ground level and plough in as the paddy are prepared for planting rice.

Seed production process:
-Transplant a few of the largest, thickest, healthiest plant into the edges of paddy space at 2 metre intervals along the terrace edges.
-Seed will be ready after 6-7 months. This can be used as seed for green manure next year.

Role of stakeholders: Government;
-Institutional roles; NARC, HAF -DDC-Municipality-VDC
-Private sectors;
-Designing policies.

Other important information: -Sesbania species can be grown even under adverse conditions of drought, waterlogging, salinity, etc.
-Optimum time of Daincha seed production is the middle of March until the end of May.

-Experiment conducted at several research stations showed that green manuring with daincha in rice increased the grain yields by about 20-25 percent (Pre rice green manure-a success story, B.H.S Basnet, NARC)

**LOCATION**

Location: Surkhet, Nepal, Nepal

Geo-reference of selected sites
- 81.36, 28.36

Initiation date: n.a.
Year of termination: n.a.
Type of Approach
- traditional/indigenous
- recent local initiative/innovative project/programme based
**APPROACH AIMS AND ENABLING ENVIRONMENT**

**Main aims / objectives of the approach**
The Approach focused mainly on SLM with other activities (Sesbania species increases nutrient content of the soil, due to its water logging tolerance and also increases the fertility, biomass production in the fields as well as nitrogen content of the soil by fixing large amount of Nitrogen.)

- Increase the nutrient in the soil due to its water logging tolerance and thus increases the fertility and productivity.
- Also reduce the need of artificial fertilizers

The SLM Approach addressed the following problems: Low knowledge about the green manuring among people because of which they were lured towards more use of particles and fertilizers.
Lack of improved seeds of green manure (plants).

**Conditions enabling the implementation of the Technology/ ies applied under the Approach**
- Legal framework (land tenure, land and water use rights): The existing land ownership, land use rights / water rights moderately helped the approach implementation: There was a bit hindrance. Seed cultivation requires both land use and irrigation system.

**Conditions hindering the implementation of the Technology/ ies applied under the Approach**
- Availability / access to financial resources and services: Improved and large seeds of green manure are costly. This can be reduced if we can make these seed locally available at subsidized rate. Treatment through the SLM Approach:
- Knowledge about SLM, access to technical support: People were found unaware of the proper and new techniques of manuring.
- Other: The species shows better growth and higher biomass yield in the sandy clay than in heavy clay soil. Treatment through the SLM Approach: The areas with sandy clay loam should be identified if we are to except a high crop yield.

**PARTICIPATION AND ROLES OF STAKEHOLDERS INVOLVED**

**Stakeholders involved in the Approach and their roles**

<table>
<thead>
<tr>
<th>What stakeholders / implementing bodies were involved in the Approach?</th>
<th>Specify stakeholders</th>
<th>Describe roles of stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>local land users / local communities</td>
<td>Farmers community</td>
<td>Men were involved more, because of the hard work in the field. Many people are using the green manure technique to increase the crop yield but no any incentives and support has been provided by government institutions targeting the socially and economically disadvantaged groups.</td>
</tr>
<tr>
<td>local government</td>
<td>Hierarchy; District Development committee - Municipality-VDC</td>
<td></td>
</tr>
<tr>
<td>national government (planners, decision-makers)</td>
<td>Ministry of agriculture</td>
<td></td>
</tr>
</tbody>
</table>
Involvement of local land users/local communities in the different phases of the Approach

<table>
<thead>
<tr>
<th>Phase</th>
<th>None</th>
<th>Passive</th>
<th>Support</th>
<th>Interactive</th>
<th>Self-mobilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation/motivation</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
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<tr>
<td>Monitoring/evaluation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>✓</td>
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</tr>
</tbody>
</table>

- **Initiation/motivation**: Farmers involved at the beginning, gradually supported by many institutions.
- **Planning**: Involvement of individuals (farmers) at the beginning, gradually supported by many institutions.
- **Implementation**: Sesbania is a local species available in Nepal since 1960 and used as green manure by farmers.
- **Monitoring/evaluation**: Gradual progress and support from government and institutions.
- **Research**: Research being carried out by institutions, on nutrient content and new species of green manure plant.

Flow chart

**Decision-making on the selection of SLM Technology**

- Decisions were taken by:
  - mainly land users, supported by SLM specialists
  - all relevant actors, as part of a participatory approach
  - mainly SLM specialists, following consultation with land users
  - SLM specialists alone
  - politicians/leaders

- Decisions were made based on:
  - evaluation of well-documented SLM knowledge (evidence-based decision-making)
  - research findings
  - personal experience and opinions (undocumented)

**TECHNICAL SUPPORT, CAPACITY BUILDING, AND KNOWLEDGE MANAGEMENT**

- The following activities or services have been part of the approach:
  - Capacity building/training
  - Advisory service (✓)
  - Institution strengthening (organizational development)
  - Monitoring and evaluation
  - Research

- Advisory service was provided:
  - on land users' fields
  - at permanent centres

- Name of method used for advisory service: Participatory community-based approach.
  - Many people including farmers, land users participate, discuss and conclude about the way of practicing green manuring.
  - Advisory service is quite adequate to ensure the continuation of land conservation activities.
  - Government and institution are the one that make the seeds of green manure plant available to the local farmers. So, their contribution and continuation of land conservation activities cannot be neglected.

- Institution strengthening:
  - Institutions have been strengthened/established at the following level:
    - no
    - yes, a little
    - yes, moderately
    - yes, greatly

- Type of support:
  - financial
  - capacity building/training (✓)
  - equipment

- Monitoring and evaluation:
  - Bio-physical aspects were regular monitored by government through observations; indicators: Nutrients like N,P,K are monitored at a regular basis by and institutions like NARC,HAF, government land users/farmers economic/production aspects were regular monitored by land users through observations; indicators: crop yield per hectare. There were few changes in the Approach as a result of monitoring and evaluation; seed varities of sesbian species shows better growth in sandy clay than heavy clay soil. So, the soil type needs to be considered.

- Research:
  - Research was carried out on-farm.
  - Research treated the following topics:
    - sociology
    - economics/marketing
    - ecology (✓)
    - technology
FINANCING AND EXTERNAL MATERIAL SUPPORT

Annual budget in USD for the SLM component

<table>
<thead>
<tr>
<th>Budget Range</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2,000</td>
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<tr>
<td>2,000-10,000</td>
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<tr>
<td>10,000-100,000</td>
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<td>100,000-1,000,000</td>
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<tr>
<td>&gt; 1,000,000</td>
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</tbody>
</table>

Precise annual budget: n.a.

The following services or incentives have been provided to land users

- Financial/ material support provided to land users
- Subsidies for specific inputs
- Credit
- Other incentives or instruments

Financial/ material support provided to land users

Governmental Aid.

Credit

- Conditions: n.a.
- Credit providers: n.a.
- Credit receivers: n.a.

IMPACT ANALYSIS AND CONCLUDING STATEMENTS

Impacts of the Approach

Did the Approach help land users to implement and maintain SLM Technologies?
- It increases the fertility and nutrient content of the soil due to its water logging tolerance. Helps control soil erosion. It also improve the quality of soil and crops.

Did the Approach empower socially and economically disadvantaged groups?

Poor farmers earn quite a good sum due to increase in yield and productivity by using sesbania as green manure.

Did other land users / projects adopt the Approach?

NARC which provide training as well as focus on the practice of green manuring which help all the villagers to get benefitted.

Main motivation of land users to implement SLM

- Increased production
- Increased profit(ability), improved cost-benefit-ratio
- Reduced land degradation
- Reduced risk of disasters
- Reduced workload
- Payments/ subsidies
- Rules and regulations (fines)/ enforcement
- Prestige, social pressure/ social cohesion
- Affiliation to movement/ project/ group/ networks
- Environmental consciousness
- Customs and beliefs, morals
- Enhanced SLM knowledge and skills
- Aesthetic improvement
- Conflict mitigation

Sustainability of Approach activities

Can the land users sustain what has been implemented through the Approach (without external support)?

- No
- Yes
- Uncertain

Since it is easy and natural method to increase the fertility of the soil, farmers can be benifited...it only requires the basic knowledge about the seasons and seeds (improved) so it can be easily implemented.

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view

- If some species of sesbina like Sesbania cannabina are established as an intercrop in rice.
- During short Day season, vegetative growth of the plant is reduced due to early flowering.
- Many Sesbania species are being over ploited.
- Improved seeds of sesban sp, ar costly and this technique requires a lot of labour work, people are in more favour of artificial chemical fertilizers. (How to sustain/ enhance this strength: it can be suppressed by the rice is sown 30-60 days after crop.
- These sp. should be sowed in the middle of March to end of vegetables growth.
- Attention must be given to the conservation and proper utilization of these important plant species.
- Government/ local bodies should make it available at cheaper rate and encourage people to revive interest in green manures.)

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

- Increase the fertility of the soil.
- It can help to increase the biomass in the soil.
- Increases microorganisms and their activity in the soil. (How to sustain/ enhance this strength: They can be enhanced if the
present trend of exploiting green manuring plants are changed to develop their production on a sustainable basis.

REFERENCES

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Thek Gurung - SLM specialist

Full description in the WOCAT database
https://qcat.wocat.net/af/wocat/approaches/view/approaches_2483/

Linked SLM data
n.a.

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Project
• n.a.

Key references
• Green Manure Production System For Asian Ricelands, J.K Ladha