Diversifying Choices, Securing Livelihoods

Title:

Diversifying family nutrition of smallholder tribal farmers through different conservation agriculture crop production systems in the sloping lands of Nepal mid-hills

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Outline

1) Background, i.e., the problem/issue addressed by the study;
2) Aims, i.e., the study's importance or relevance to the field and the major hypotheses;
3) The design or methodology (including measures used);
4) Major results; and
5) Major conclusion(s).

Project Information

Feed the Future (FtF) Food Security Innovation Lab: Collaborative Research on Sustainable Agriculture and Natural Resource Management (SANREM)

LTRA 11: Conservation Agricultural Production System (CAPS) among tribal societies in India and Nepal

Project title:

Sustainable Management of Agroecological Resources for Tribal Societies (SMARTS)

(2010-2014)

1. Background: Context

Current farming practices in the sloping lands are not sustainable (mono cropping and frequent cultivation)

Agriculture in mid-hills of Nepal

1. Background: Field Situation…

1. Background: Rationale

Conservation agricultural production systems (CAPS) can sustain agricultural production through improving yield, enhancing soil quality, and reducing risk of crop failure. (Atreya et al., 2006; Kassam et al., 2009; Jat et al., 2010)

Research based knowledge on conservation agriculture especially in the global south is limited

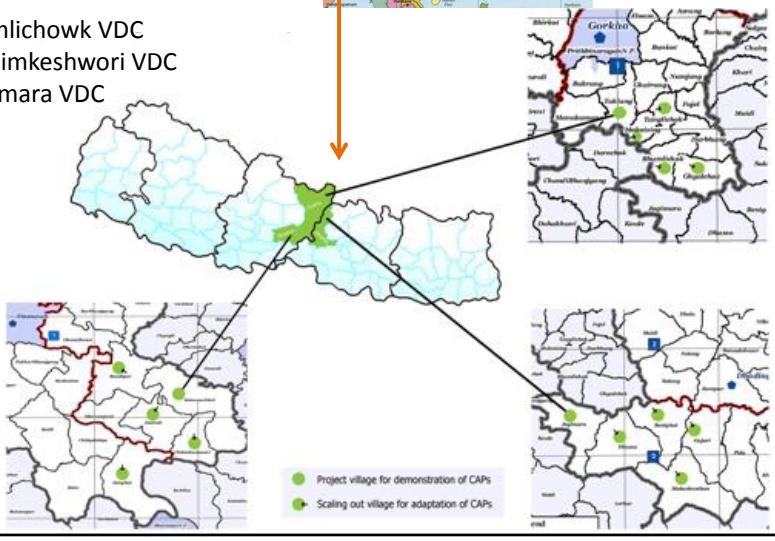
In the developing countries, there is a need to develop and implement suitable CAPS through on-farm research to strengthen capacity of farming communities and enhance adoption

2. Aims

The project aims at identifying and developing CAPS for marginalized smallholder tribal farmers that;

Project Sites

Gorkha: Bhumlichowk VDC
Tanahun: Chhimkeshwori VDC
Dhading: Jogimara VDC

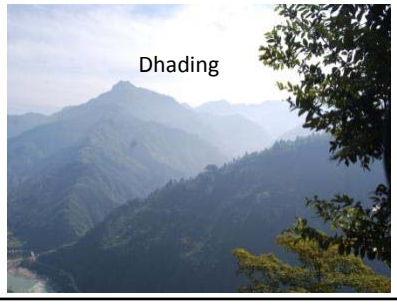


Farmers in the Research Site

Chepang Community

1. Semi-nomadic groups
2. Heavily dependent on sloping land
3. Practice shifting cultivation
4. Food sufficiency (<6 months)
5. Limited livelihood resources
6. Poor sanitation
7. Poor education
8. Traditional indigenous culture

Site overview



Demography of project sites

Parameters	Thumka	Hyakrang	Kholagaun
Average HH size	9.6	7	5.75
% female	55%	48%	57%

- 84.3% HHs cultivate Khoria land – most of times area estimation is very rough
- Existence of shifting cultivation in slopping land, the years of fallow in shifting cultivation greatly reduced in recent years

Socio-economic profile of project sites

Low income and high dependence on slopping land

Source: Project baseline survey, 2011

Major crops for maize-based rain-fed hill in project sites

Project sites:

Summer season (Mar-Jun)

- Maize (90%)

Post summer season (Jul-Nov)

- Cowpea = 46%
- Black gram = 26%
- Millet = 8%

(source-unpublished baseline data)

National data:

Summer Season

- Maize

Post summer season

- Millet → 37.9%;
- Cowpea → 1.3%;
- Black gram → 2.6%
- Other legume (soybean, horse gram, green gram, pea, rice bean etc.) → 6.2%

3. Design of Experiment

- CAPS Treatments were identified in participatory consultation with Chepang farmers

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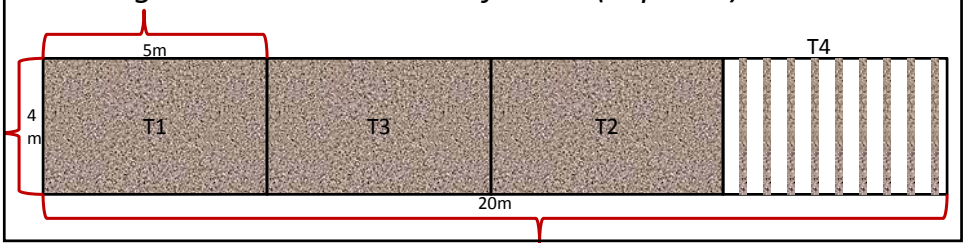
- Treatments were identified in participatory consultation with Chepang farmers
- Set up on-farm trial with 24 farmers
- Each farmer = 1 replication [4 plots; each plot=20 sq.meter]
- Randomized block design
- Number of replication=24

Fig. Trial outlook in each farmer (Topview)



3. Design of Experiment

Analysis included: Yield of Crops, Land Equivalency Ratio, and Profit,

Land equivalency ratio (LER) is the ratio of the area under sole cropping to the area under intercropping needed to give equal amounts of yield

Parameters observed: Plant population,
Plant density,
crop yield (Kg/plot),
market price of crops,
cost of production

Land Equivalent Ratio (LER)

- LER is the sum of the fractions of the intercropped yields divided by the sole-crop yield.

  $LER = (Yi_1/Ym_1) + (Yi_2/Ym_2) + (Yi_3/Ym_3) + \ldots + (Yi_n/Ym_n)$

  where,

  Yi= yield of each crop or variety in the intercrop, and

  Ym= yield of each crop or variety in the sole crop.

- *If LER=1.0, i.e.* no difference in yield between the intercrop and the collection of monocultures
- If LER>1.0, i.e. it indicates a yield advantage for intercrop.

For example: A LER of 1.2 indicates that the area planted to monocultures would need to be 20% greater than the area planted to intercrop for the two species to produce the same combined yields.

4. Major Results

4. Major Results: Maize yield under CAPS

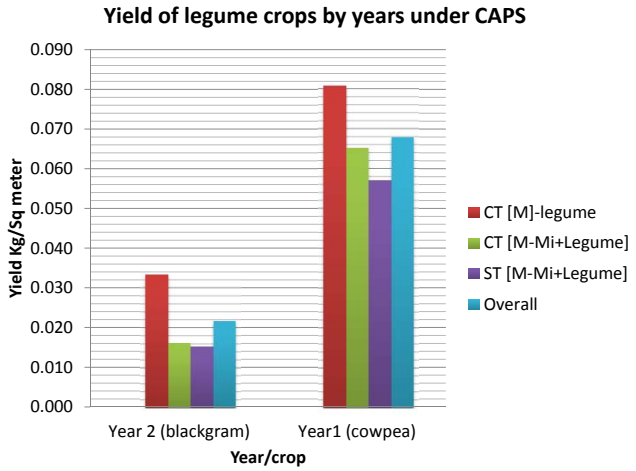
Maize yield was not affected by the treatments in both years

4. Major Results: Millet yield under CAPS

Millet yield (kg/sq meter) by treatment and year

- Millet yield in Year 2 is significantly higher than Year 1, because of higher competitiveness of millet to black gram as compared to cowpea

4. Major Results: Legume yield under CAPS



4. Major Results: Land Equivalency Ratio (LER)

- Types of tillage, intercropping practice were significant (p values=0.01)
- Intercropping system had higher LER than sole crops

4. Major Results: Economics of CAPS

Enterprise budget analysis of CAPS

CT [M-C] gives highest revenue and profit regardless of using family labor or hired labor Any of intercropping and tillage treatments are also better than CT [M-Mi]

4. Major Results: Farmers' preference

CAPS preference Workshop:

CT[M-Legume] is preferred by farmers, CT [M-Mi+Legume] is also profitable; still effect of strip tillage is yet to reveal

Table : Participation of farmers in CAPs preference workshop

Project sites	Male	Female	Total
Thumka	10	5	15
Kholagaun	8	6	14
Hykrang	12	4	16

5. Major Conclusion

Technologies being tested have potential for increasing profitability of the maize based hill farming system in Nepal as well as ensuring food and nutrition security due to

- Increased crop production due to soil conservation
- Restored soil fertility due to legume integration
- Increased farm income due to legumes
- Diversified nutritional sources from farm (Cereals=energy; Legumes=Protein)

6. Opportunities

- Increasing farm income in maize-millet system through legume intercropping and strip tillage in Nepal
- Scaling up of potential findings in similar climatic condition (tropical to sub-tropical to warm temperate areas) in Nepal
- Climate change adaptation (drought, erratic rainfall) and mitigation in sloping land (integration in Local Adaptation Plans (CAPA, LAPA and WAPA)
- Integrated Watershed management (Pollution of aquatic system and low land flood reduce, soil fertility improvement)------Promotion of ecosystem and human health

Thank you

Celebrating...

United Nations Decade on Biodiversity

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