

INTRODUCTION

Constraints in food production in Northern Uganda are labour, unsustainable soil fertility management, and climate change. Consequently, rural households are food insecure and trends are that it will worsen further. Some farmers have themselves developed a range of promising Conservation Agriculture (CA) initiatives. This project will 1) establish the relationship between these promising initiatives, the productivity of the farming systems, and the sustainability and resilience of its land management. 2) identify and develop methods for improving these local CA initiatives, and 3) build the capacity of extension services so that best methods will be incorporated in their farmer support and dissemination mechanisms.

OBJECTIVES

To further develop and foster Conservation Agriculture in the Acholi and West Nile sub-region, through farmer-led innovations and improved capacities among extension services to support local initiatives. The Outcome Objectives are:

1. The local farming communities in Nwoya, Pader and Nebbi adopt improved CA crop production technologies (500 households)
2. Farmer to Farmer training model and improved CA practices are promoted through LG extension system (3 districts)



Fig: Clear visual difference in weed infestation after harvest on a plot cultivated by the improved CA package (left) and traditional farming operations (right).

RESEARCH QUESTIONS AND RESULTS

RQ1: To what extent do local CA initiatives result in sustainable land use and improved food security?

Farmer decision making on production practices is a key aspect to consider in participatory action research. Through focus group discussions on different production systems and their calendar it became clear that farmers have a deep understanding of rotational and intercropping practices, and that they protect their soil to some extent with low inputs. A variety of indigenous knowledge also emerged from this:

- ❑ Chemical land opening by herbicide is preferred only during the 2nd season because then labor is the most limiting factor
- ❑ Burning of plots is practiced to address both weed pressure and soil fertility degradation
- ❑ After herbicide application, one tillage operation is still believed useful as it incorporates stover into the soil for decomposition and as it loosens the soil for planting

Table 1. Labour requirements [man-day/acre] in Nwoya district for 4 combinations of farmer operational activities as compared to the traditional practice of slash/burn double-tillage and improved CA to open fallow land.

Farming operations	Slashing	Herbicide	Burning	Tillage I	Tillage II	Planting
Traditional	10		1	10-15	10-15	4-10
Combination 1		1	1	10	10	4-10
Combination 2		1				4-10
Combination 3		1	1	10		4-10
Combination 4				15		4-10
Improved CA package	5	1				10



Fig 1. a) Superb trial field of intercropped maize and beans under reduced tillage in Pader; b) Lead farmer in Pader experimenting with glyphosate concentrations during land opening, and c) ZOA project officer admiring the stover remaining after groundnut & maize cultivation in preparation of the next direct planting operation in Nwoya district.

RQ2: How can local CA initiatives be improved in terms of labour and inputs, and their contribution to overall sustainable production levels?

Cost efficiency of different CA practices was assessed in terms of labour & inputs and their contribution to overall sustainable production levels. Through participatory analysis, possible modifications of valid local CA initiatives were identified, incorporated and compiled into an improved production package for further evaluation. This consists of:

- ❑ Chemical land opening by pre-emergence glyphosate (1l/acre)
- ❑ Reduced tillage by shallow hoe planting
- ❑ Strictly no burning
- ❑ Inoculum of Rhizobium spp.
- ❑ Spot application of fertilizers

Returns on labor (UGX/man day)	1 tillage operation	2 tillage operations
Traditional cultivation 2014A	13,410 (s.d. 14k)	16,311 (s.d. 19k)
Improved package 2015A	25,395 (s.d. 9k)	N/A

ACTIVITIES IMPLEMENTED

- ❑ 2 Inception workshops and Radio shows organized
- ❑ Households profiled on food security, farm income levels, yield performance and plot cultivation history
- ❑ 90 lead farmers selected based on their innovative soil management practices and on-farm trials with improved production practices executed
- ❑ Focus group discussions to explore farmer decision making, to understand perceptions to soil management and to formulate improved production package
- ❑ Farmer to farmer exchange visits held by lead farmers to discuss on-farm experiments
- ❑ Technical trainings in improved production practices given to lead farmers and direct on-farm coaching
- ❑ Soil nutrient sampling per plot category (fresh, depleted and high yielding) and weed infestation analysis for all 90 experimental plots
- ❑ Participatory soil fertility monitoring practices mapped and low tech soil analysis methodology piloted



Fig 2. a. Dr Olupot leading the soil sampling practices on the fertile soils of Nebbi district; b. Focus Group discussions in Kocwiny & Ndhew subcounties, Nebbi District, and c. ir. Van Til demonstrating low cost soil analysis methods

FUTURE OPPORTUNITIES

This project has so far considerably contributed to improved efficiency of the farming system for the selected lead farmers. Further improvements to the production package are expected as more crop enterprises will be piloted in the next seasons. There is scope for further fine tuning in the following elements:

- ❑ Mixing of glyphosate with local additives for improved effectiveness
- ❑ Increased fertilizer response from organic matter accumulation
- ❑ Integration of oxx ripping in reduced tillage system in Pader
- ❑ Early preparation of fresh plots to allow timely decomposition before planting
- ❑ Improved intercropping and legume cereal rotations
- ❑ Improved harvesting practices to retain root nodules on plot