



# Agroecology and Mechanization on Selected Congregation's Farms in Tanzania

Susan Andrew Mbacho – Makerere University; Research Team: Dr Festo R. Silungwe, Dr. Yusto M. Yustas, Dr. Nelson R. Makange, Mr. Avitus T. Kashaija, Dr. Gurbir S. Bhullar, Mr. Anton Kuchler

## Background

What mechanization is appropriate for a sustainable intensification through agroecology?

## Problem Statement

Despite global advances in agricultural technology, most farmland in Sub-Saharan Africa still relies on manual or animal labor, limiting productivity and highlighting the need for appropriate mechanization tailored to the unique challenges of agroecology.

## Approach/Methods

- ✓ Literature review on Agroecology and Mechanization globally and locally in Tanzania
- ✓ Participatory Rural Appraisal (PRA) based on focus group discussions and interviews at Usambara Sisters (Korogwe), St Vincent de Paul Sisters (Mbinga) & St Franscisco Sisters (Mlimba) as well as workshops at vicinity



## Results / Findings

### 1. Available knowledge on mechanization and agroecology intersection:

- Availability of agricultural labour will decrease, which will increase agricultural wages and promote mechanization [1,2,3]
- Medium scale farms (5-100 ha) will soon be the dominant scale of farming in Tanzania
- 70 % of Africa's food is grown by women on smallholder farms, a task attached to hard physical labour [4]

### Different farm power used in soil cultivation:

- 50% Hand how, 27% animal traction, 23% tractor, Tanzania is still in the Power substitution stage [5]
- In Tanzania the surface area under conservation agriculture (CA) is only 0.27% for the whole country [6,7]
- Sustainable farming methods in the sense of agroecology are not yet widespread in Sub-Saharan Africa and Tanzania in particular

### 2. Specific needs for Congregations

- Soil cultivation and land preparation according to conservation agriculture tools (ripper, hole digger, zero till planter, ridger, bailer, cultivators, etc.)
- Weed control with harrow, mulcher, weeder, etc.
- Combine harvesters for maize and paddy
- Input preparation such as compost and production of organic pesticides.
- Post-harvest processing, especially drying process

## Objectives

1. Review available knowledge on the intersection of agroecology and mechanization globally and locally in Tanzania
2. Identify specific needs of large farms for agroecology and mechanization
3. Assess the potential of hire services for increasing profitability of investments

### Impressions from farm visits (during rain season)



Water flooded into the rice farm fields during rain season and wash the planted rice at Mbingu Sisters

### Land terrain(1) and matengo pit making(2) - St Vincent de Paul Sisters Convent - Mbinga



Table 1: Area planned, area under agroecology and agroecology practices by congregation

Name of Congregation	Total Area Owned (acres)	Area planned for agroecology (acres)	Area under Agroecology (acres) (% of planned area)	Agroecology practices	Crops under agroecology	Total work load done with machines / by hand
Usambara Sisters (Korogwe)	2092	400	150 (37.5%)	crop rotation and intercropping;	Maize, legumes	43%/57%
St Vincent de Paul Sisters (Mbinga)	4260	300	5 (1.7%)	crop rotation intercropping	Maize and beans Groundnuts and paddy plantations.	29%/71%
St Franscisco Sisters of Charity (Mlimba)	7413.2	500	40 (8%)	Crop rotation, mixed cropping, intercropping	Rice and maize(rotate), Cocoa and banana,	43%/57%

### 3. Potential for hiring Services

Table 2: Current Cost of hiring for different operations per acre

Name of Congregation and location Operations	Usambara sisters	St. Vincent de Paul Sisters Convent	St Franscisco Sisters of Charity
	Korogwe Tshs (USD)	Mbinga Tshs (USD)	Mlimba Tshs (USD)
Ploughing	60,000/= (24)	60,000/= (24) – 100,000/= (40)	50,000/= (20) - 100,000/= (40)
Harrowing	40,000/= (16) - 50,000/= (20)	-	50,000/= (20)
Planting	32,000/= (12.8)	25,000/= (10)	40,000/= (16)
Weeding	40,000/= (16) - 60,000/= (24)	50,000/= (20) – 80,000/= (32)	80,000/= (32) – 100,000/= (40)
Harvesting	3,000/= (1.2) – 4,000/= (1.6) /day	50,000/= (20)	130,000/= (52) - 150,000/= (60)

- In their current situation they can not perform Mechanization hiring services

Table 3: Status of agroecology-based machines and equipment

S/N	Type of agroecological machine available	Usambara Sister	St. Vincent de Paul Sister Convent	St. Fransisco Sisters of Charity
1	Ripper	0	1	0
2	Subsoiler	1 – Need high HP	0	0
3	Sprayer	1	0	0
4	Hole digger	0	0	0
5	Zero till planter	0	0	0
6	Trailer for carrying manure	1	1	1
7	Ridger	0	1	0
8	Bailer	0	0	0

### Challenges of farm machinery operation and management:

- The farms visited owned workshops that are inadequately equipped.
  - The staff responsible for these workshop lack the knowledge required for proper maintenance of farm machinery/implement/tools.
  - Limited training on operations and management of machines.
  - The machines are not evaluated correctly from a business management perspective (lack of diagnostic equipment or tools, etc.) and
  - Spare parts are difficult and expensive to obtain.
- The workshop visited at vicinity were still not well equipped to offer maintenance services to the congregations.

**All this leads to a very limited functionality of the machines. Small and medium-sized farms rent machines from the surrounding area, but these are usually only available to a limited extent.**

## Conclusions

- ✓ Limited or no agricultural machines and implements are available for agroecological practices such as conservation tillage (1)
- ✓ The congregations have large land available (2)
- ✓ The congregations wants to intensify the surface for agroecological practices (2)
- ✓ Ploughing, Weeding and Harvesting are the most labor-intensive and costly operations (2)
- ✓ Production of compost and other organic input is something need mechanization (2)
- ✓ Postharvest facilities, incl. machines are missing for improving the drying process of the harvested produce (2)
- ✓ No experts in agricultural machines are present, the mechanics are trained on automobile basic driving and maintenance (3)
- ✓ All congregations have potential for offering machinery hire services capacitated to manage and do maintenance of the farm machinery (3)

(Daum and Birner, 2020<sup>1</sup>; Diao *et al.*, 2020<sup>2</sup>; FAO and AUC, 2018<sup>3</sup>; Bafana, 2019<sup>4</sup>; SAMA Report, 2018<sup>5</sup>; ACT, 2017<sup>6</sup>; IFPRI, 2016<sup>7</sup>)