

**PROJECT TITLE: EFFECTIVENESS OF COMPOST MANURE- FOOD FOR LIFE -
FOOD FOR LIFE-MALAWI**

PROGRESS REPORT FOR DECEMBER 2025 TO MARCH 2026

BY

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LIST OF ABBREVIATIONS

EPA:	Extension Planning Area
LUANAR:	Lilongwe University of Agriculture and Natural Resources
AEDC:	Agriculture Extension Development Coordinator
AEDO:	Agriculture Extension Development Officer
EC:	Electrical Conductivity
OM:	Organic Matter

Executive summary

The use of organic manure has increased significantly in many parts of the world, and this has mainly been necessitated by the high cost of inorganic fertilizers. This report provides a summary of the key activities, observations and selected results in a collaborative research project titled “Effectiveness of Enriched Compost Manure” between Lilongwe University of Agriculture and Natural Resources and the Stichting the Art of Netherlands from December 2025 to March 2026. The main objective of the research project was to evaluate the effectiveness of different compost manures on the performance of maize. The study involved seven treatments with different application rates. Prior to the commencement of the study, the different compost manures were analyzed for different parameters which included nitrogen, organic matter and nitrogen content. Results from the manure analysis showed significant differences in the different parameters with the chicken manure containing highest nitrogen content compared to the other types of manures. In terms of maize performance, it was observed that maize performance was good for the chicken manure combined with cow manure, plant residues and urea and was seconded by maize grown on chicken manure only. Maize performance was very poor for the control treatment and cow manure only. As the study progresses, there is expectation that the results would provide interesting insights into the effectiveness of different manures so that useful recommendations can be drawn.

1. Introduction

Soil degradation is one of the key challenges affecting maize productivity in Malawi. The use of organic manures is one of the strategies for improving soil health. A research project titled “*Effectiveness of Enriched Compost manure*”, a collaborative project between the Stichting the Art of Charity in Netherlands and Lilongwe University of Agriculture and Natural Resources (LUANAR) in Malawi, is being implemented in Lilongwe district at Bunda Campus of LUANAR and in Salima district. The main objective is to evaluate the effectiveness of compost manure on performance of maize

2.0 Methodology

2.1 Project sites:

On-farm trials were established at Bunda College, Mkwinda Extension Planning Area (EPA) of Lilongwe district; and at Chikho village in Matenje EPA of Salima district, central Malawi in 2025/2026 cropping season. Bunda Research Farm is located within the LUANAR campus, The mean annual temperature ranges from 18 to 24°C, and average rainfall of 600 to 1100 mm/annum. BUNDA trial site is located at the latitude and longitudes of S 14°11.234 and E 033° 46.301 respectively. The trial site in Salima is located at latitude and longitudes of N 13.600078° and 34.265685° respectively; at an altitude of 592.62 metre above sea level and flat land.

Lilongwe lies in the mid altitude agroecological zones (altitude-1000-1300m above sea level) and annual rainfall of 800-1200mm. Salima district is in the low altitude agroecological zones (AEZ) at 445-650m above sea level, characterized by high temperatures, low and poor rainfall distribution, and a short rainfall season. Rainfall is unimodal with precipitation received from November to April. For the rainfed production, the cropping season is mainly from November to April and may extend to August/September for long duration crops such as cassava and pigeon pea.

2.2 Site selection and cropping history

The land was selected based on the cropping history, land size and slope. Cropping history of the selected farm for the past two seasons is presented in Table 1. Farmer assessment of soil fertility: the soil fertility is variable on the plot. Overall, soil fertility is low to medium, and crops like maize require application of fertilisers to enhance crop productivity.

Table 1: Cropping history for the study sites

Parameters	Chikho village, Salima		2022/2023	Bunda site	
	2023/2024	2024/2025		2023/2024	2024/2025
Crops planted	Sole soybean	Sole cropped maize	Green gram	sorghum	Groundnut
Land preparation for planting	Ridges	Ridges	Ridges	Ridges	Ridges
Soil fertility management	None	Compost manure (combination of crop residues, green plant materials, and animal droppings from cattle and chickens)	None	100 kg/ha of NPK fertiliser	None
Crop residues management	Threshing of soybean done in field. All crop residues incorporated in the field after harvest	Maize stovers burned in the field after harvest			

2.3 Land preparation

The land was first cleared to remove the grown weeds since the trial was meant to be planted late in the season. Planting holes were made following the protocol, which were spaced at 0.6m by 0.6m between rows and planting station respectively, except the control through which ridges were made spaced at 0.75m. The sub plots were allocated to the treatments following the protocol, which indicated seven treatments of 16m by 39m each, totaling to 0.47 hectares.

2.4 Treatments

There were seven treatments consisting of manure different sources of livestock manure (Table 2). All manures were applied to each planting hole before planting.

Table 2: Treatments

No.	Treatment	Ratio for livestock combinations	Rate of manure/ha kg/ha
1	Control	No manure applied	0
2	Chicken manure		5609
3	Cattle manure		5609
4	Cattle manure +green plant residues		5609
5	Chicken + cattle manure	0.50:0.50	5609
6	Chicken manure +cattle manure+tobacco	0.50:0.50	5609
7	Chicken manure +cattle manure+green plant residues + urea	0.50:0.50	5609

Table 3: Quality of manure

Manure type	Nitrogen (%)	Organic Carbon (%)	Inorganic phosphorus	Phosphorus (%)
Chicken	3.55	16.3	550	-
Cattle	1.98	9.3	535	-
Tithonia	3.50	16.2	-	0.300
Tobacco stems	4.27	14.0	-	0.297

2.3.1 Land selection, preparation and plot layout

The land was selected based on the cropping history, land size and slope.

The land was first cleared to remove the grown weeds since the trial was meant to be planted late in the season. Planting holes were made following the protocol, which were spaced at 0.6m by 0.6m between rows and planting station respectively, except the control through which ridges were made spaced at 0.75m. The sub plots were allocated to the treatments following the protocol, which indicated seven treatments of 16m by 39m each, totaling to 0.47 hectares.

2.4 Agronomic practices:

Manure application: Planting holes were dug following the specified measurements. Manures were finally applied on each planting hole following the protocol in respect to the treatment which include, 350kg chicken manure only, 350kg cattle manure only, 350kg cattle manure

and green material, 175kg cattle and 175 chicken enriched with green material, 175kg cattle manure and 175 chicken manure enriched with tobacco stem powder, 175 cattle manure and 175 chicken manure enriched with Urea fertilizer, and control planted on ridges without nutrients.

Planting: Planting was done on 14th January 2026 and 24th January 2026 for Lilongwe and Salima site respectively. The seeds were planted in holes, two seeds per planting station. The plots were kept weed free.

2.5 Data collection

Soil sampling and analysis: Baseline soil samples were collected for site characterization. These soil samples were analysed for selected soil properties (pH, organic carbon, nitrogen, phosphorus, potassium, soil texture)

Plant data: data were collected on plant stand count after germination by counting number of plants that germinated. Plant height and leaf chlorophyll were collected from 10 randomly selected plants from three to seven weeks after planting. Chlorophyll was measured with a SPAD meter.

3. Results

3.1 Baseline soil characteristics of the study sites

Results on baseline soil characteristics are presented in Table 4. The soils at Bunda site in Lilongwe are strongly acid to acid (pH: 4.79 - 5.36), and non-saline (EC: 307 - 922 μ S/cm. Soil organic matter (OM) vary from with very low to low. (0.9% to 1.4%) The total soil nitrogen (N) ranges 0.118% \rightarrow 0.208% (low to high), while available P medium to moderately high (13.4 \rightarrow 26.6 mg/kg) but likely fixed by soil acidity. These soils require a combination of addition of organic residues or fertilisers to improve soil OM and liming to reduce soil acidity.

For Salima site, the soils are moderately acid to slightly acid (pH 5.71 -6.23), and non-saline. The soil OM (1.1% \rightarrow 2.2%) is low to medium. Total soil N and available P range from medium to high.

Table 4: Baseline soil characteristics at Bunda College, Lilongwe and Chikho village in Salima

Site	Plot ID /manure type	% Clay	% Silt	% Sand	Texture class	pH	EC (μ/cm)	OM (%)	% N	Inorg P (mg/kg)
Salima	Control	27	9	64	Sandy clay loam	5.85	1354	2.2	0.238	45.5
	Tobacco, cattle, chicken	11	9	80	Sandy loam	6.05	674	1.1	0.186	44.6
	Chicken, cattle, green compost	11	3	86	Loamy sand	6.23	417	2.2	0.187	59.6
	Cattle, green compost	11	5	84	Silt loam	5.76	507	1.5	0.138	57.4
	Cattle	9	5	86	Loamy sand	5.84	621	1.4	0.155	41.6
	Chicken, cow, green compost, fertiliser	9	9	82	Loamy sand	5.71	821	1.8	0.211	39.2
	Chicken	13	11	76	Sandy loam	6.11	968	1.8	0.190	39.0
Lilongwe	Control	15	13	72	Sandy loam	5.36	373	1.4	0.135	16.5
	Chicken	17	13	70	Sandy loam	4.79	481	0.9	0.118	13.4
	Cattle	19	9	72	Sandy loam	5.13	438		0.192	13.5
	Cattle, green compost	21	11	68	Sandy clay loam	5.01	307	1.3	0.137	16.1
	Chicken, cattle, green compost	21	7	72	Sandy loam	4.94	629	0.9	0.130	17.4
	Tobacco, cattle, chicken	23	9	68	Sandy clay loam	5.02	484	1.0	0.138	26.6
	Chicken, cattle, green compost, fertiliser	29	7	64	Sandy clay loam	5.00	922	1.4	0.208	18.4

4.2 Germination

Plant population is one of the determinants of crop productivity. There was good germination of maize at Bunda site ranging from 91 to 97%, compared to Salima (60% in the control treatment to 97% cow manure only) (Figure 2). Supplying was done in Salima. The estimated plant population per hectare is presented in Table 5. For Lilongwe site, the plant population is not different from the expected 53000 plants per hectare.



Figure 2: Germination of maize at Bunda, Lilongwe and Chikho village is Salima.

Table 5: Plant population (No. of plants/ha) after germination at the two locations

Treatments	Lilongwe	Salima
Control	47965	31578
chicken manure only	50000	38644
Cattle manure only	50096	51600
Cattle manure +greens	51170	47022
Cattle manure +chicken manure +greens	48718	37333
Cattle manure +chicken manure + tobacco residues	50641	32622
Chicken manure +cattle manure +green plant residues +urea	51651	41978
<i>Mean</i>	50034	40111

4.3 Plant growth

Figures 3 and 4 shows maize height from 3 to 7 weeks after planting (WAP) under different treatments at the two study sites. At 3 WAP, plant height did not differ among the treatments. The differences in plant height were observed after 3WAP with maize fertilized with chicken manure only or in combination with other manures growing taller than the control or maize fertilized with cattle manure. These observations in plant height after 3WAP could be attributed to increased demand for nutrient by the maize to support the rapid vegetative growth. Therefore, while early growth might be similar, by 5WAP, the higher concentration of the essential macro-nutrients such as nitrogen and phosphorus (refer to table 3) in the chicken manure supports significantly better height and leaf development than cattle manure or control treatments

Overall, plant height increased overtime and this is consistent with normal plant growth.

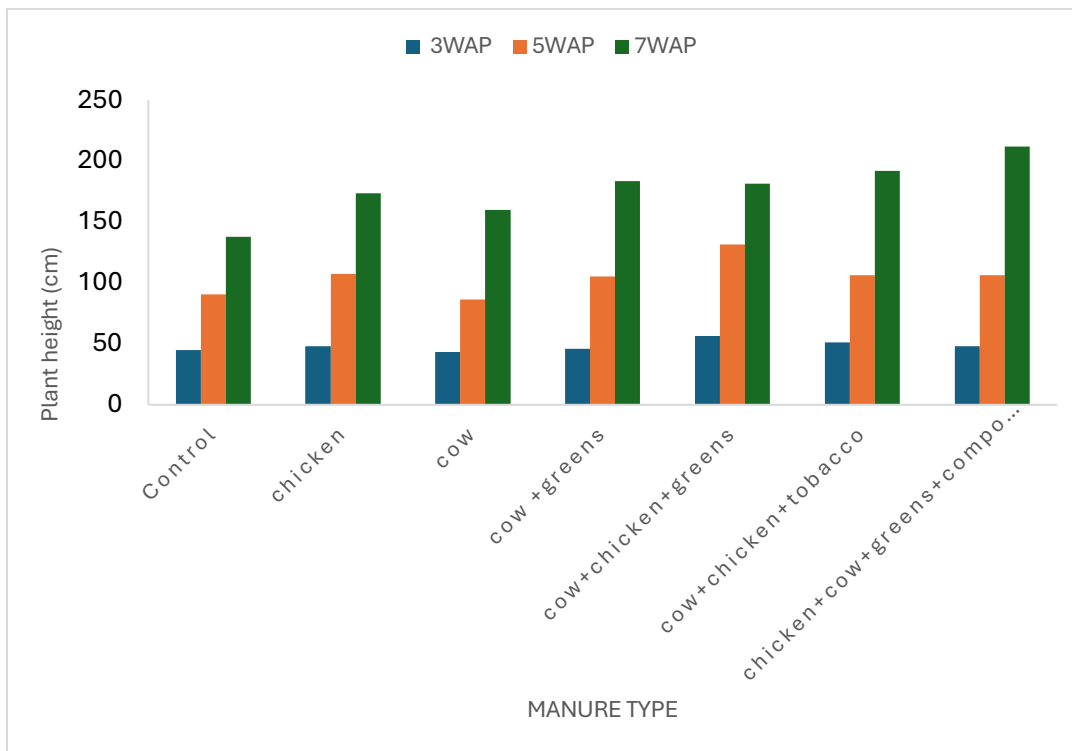


Fig 3: Effect of manure type on maize height from three to seven weeks after planting (WAP) at Bunda College, Lilongwe

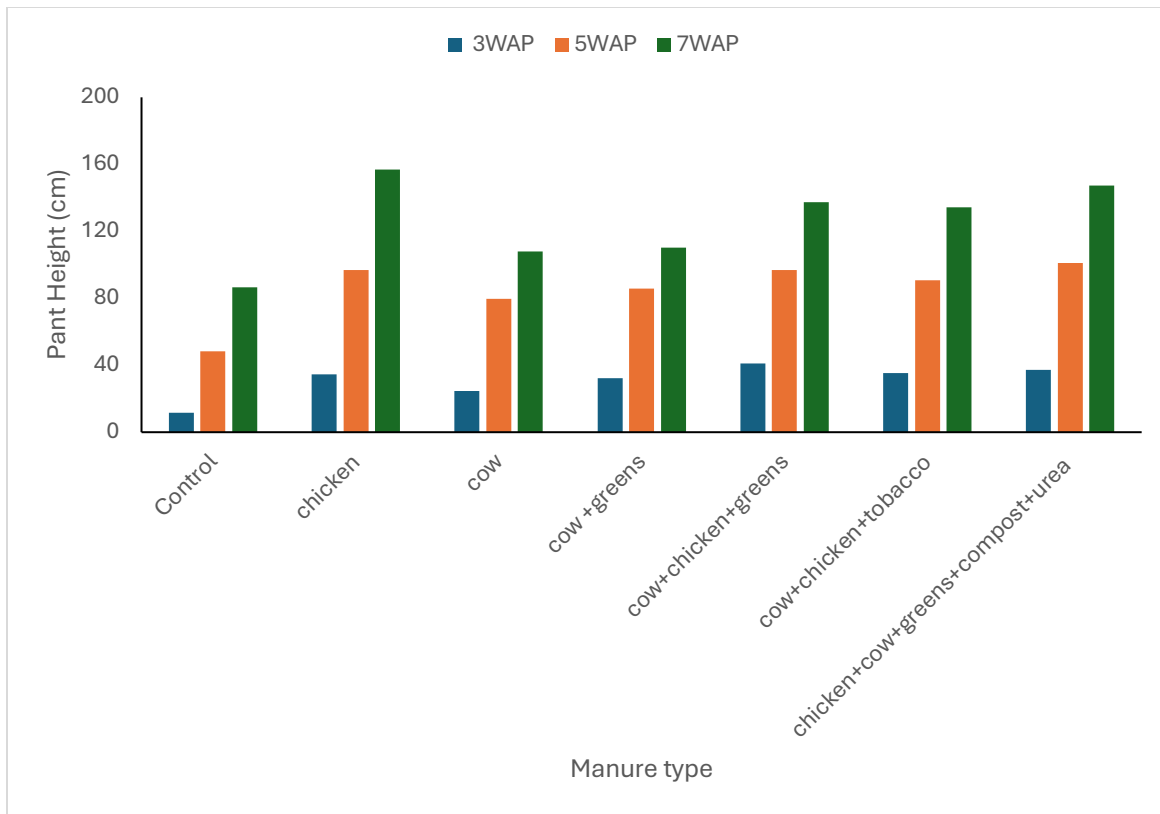


Fig 4: Effect of manure type on maize height from three to seven weeks after planting (WAP) at Chikho village, Salima

4.4 Maize Leaf Chlorophyll from three to seven weeks after planting

Nitrogen is one of the components in chlorophyll molecule, a photosynthetic pigment that is important for capture energy in photosynthesis, a process that directly affects plant growth and reproduction. The results showed that chlorophyll content varies with the treatments. Highest chlorophyll content was observed in maize with any manure containing chicken droppings and lowest in maize with cow manure only or the control (Figures 5 and 6). Over time, there was a decrease in chlorophyll content in maize fertilized with cattle manure or the control.



Cattle manure only, Bunda site



Cattle manure only, Salima site

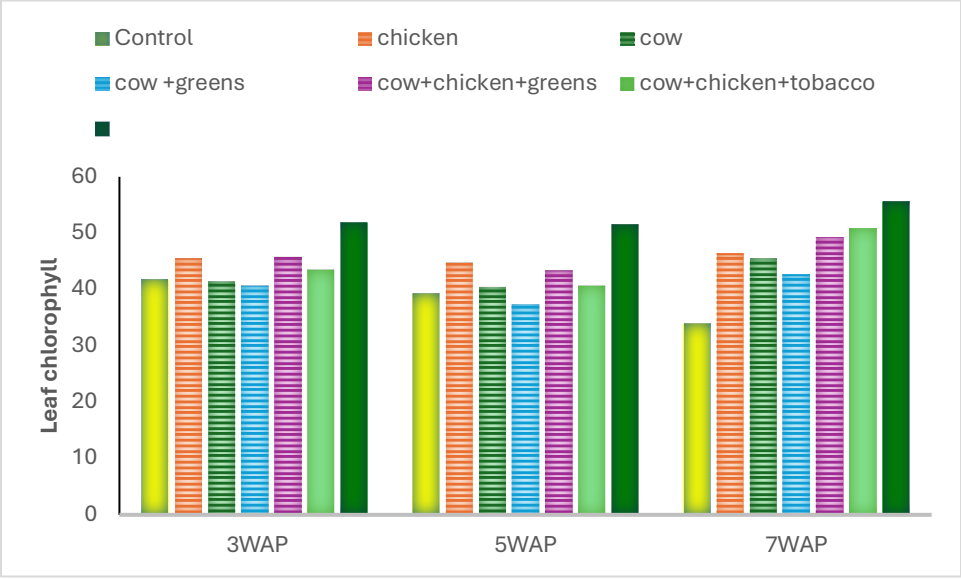


Fig 5: Maize Leaf chlorophyll from three to seven weeks after planting (WAP) at Bunda College site, Lilongwe

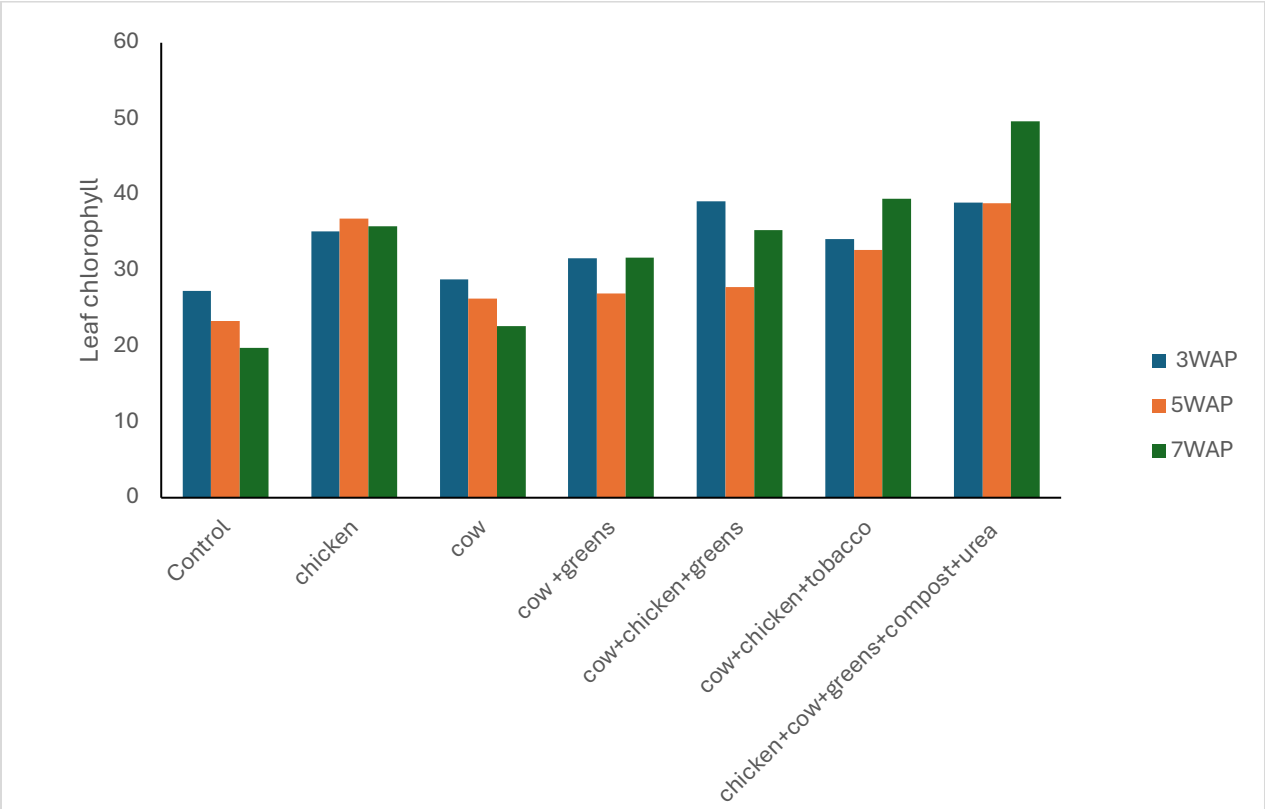


Fig 6: Maize Leaf chlorophyll from three to seven weeks after planting (WAP) at Chikho village site, Salima

Challenges

- Salima experienced dry spells and high temperatures in the month of January 2026. As a result, maize was planted late (end of January)
- The maize at both sites was attacked by fall army worm. This negatively affected performance of the maize.

Way forward

Since the research work is still on going, no recommendations will be made mid-way, and it is expected that conclusions and recommendations will be made after the project is concluded.

The financial report will be presented separately.

The workplan for the remaining months is presented in Table 6.

Table 6: Tentative workplan for April -June 2026

	Activity	Timeline	Lead
1	Monitoring and data collection	April -May 2026	Mhango
2	Procurement of harvesting supplies	April-May 2026	Masamba
3	Harvesting	May -June 2026	Manase/Mhango
4	Farmer feedback on technology performance	May -June 2026	Mhango/Masamba
5	Data entry and analysis	May -June 2026	Project team
6	Report submission	June 2026	
11	Consolidation of progress reports	Due on the first day of each month	Mhango/Masamba
12	<i>Other requirements</i>		
a	Procurement of stationery (field notebooks for data collection, box file, external hard drive for storage of data, printing paper)	February 5, 2026	Masamba
b	Project team meetings: planning and progress reports	Monthly meetings, April-June	Masamba
c	Check with AEDC on data on final maize yields estimates in the two EPAs (Matenje and Mkwinda)	May 2026	Mhango/Manase

5.0 Acknowledgements

The team implementing the project research activities is greatly indebted to the “Stichting the Art of Charity” in Netherlands for providing funds for the project. Thanks also to Lilongwe University of Agriculture and Natural Resources Management for accepting the project to be implemented. Lastly, thanks to the community leadership and Agricultural officials at Matenje Extension Planning in Salima for also accepting the project to be implemented in their areas.