



Pathways and challenges toward a socio-ecological transformation

*of landscapes, livestock and livelihoods in
the East African drylands*

**Field Report: Training on Kitchen Gardening and Regenerative Agriculture at the
Livestock Café site in Chepareria Ward, West Pokot County**



Reported by

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1. BACKGROUND INFORMATION

In sub-Saharan Africa, food insecurity has been persistent. Twenty-one (21%) per cent of people living in sub-Saharan Africa were food insecure in 2019. Food security is a condition necessary to be fulfilled for good nutrition to be achieved. Food security is said to be achieved when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for a healthy life (Hansen et al, 2022).

It has been indicated that the most vulnerable communities (communities in drylands are among them) will have their food security situation even more exacerbated by climate change. Therefore, it becomes imperative for these communities to adapt in order to assure their food security in the changing uncertain climate conditions. Adaptation as defined by the IPCC is actions and strategies for adjusting to actual or projected climate change-related impacts and their deleterious consequences (IPCC, 2018).

Kitchen/home gardens offer a unique opportunity for families to access healthy diets throughout the year from growing fruits, vegetables, legumes, roots, and tubers that contain adequate macro and micronutrients. Through establishing kitchen gardens, poor households can be able to access food as they are growing these foods themselves and thus do not need money to buy. Through training, they can be empowered to propagate crops whose seeds are affordably available, wildy collected or even donated and thus they reduce the costs of setting up the kitchen gardens.

The Livestock Cafes are designed to be knowledge-sharing hubs. Keeping this in perspective, then the researchers working in Drylands Transform decided to include kitchen gardens as part of the LCs. Kitchen gardens have a very high potential for impact since they are easy to set up, they are normally designed with locally available seedlings and training of residents by those already trained is easy and feasible.

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¹ *Cover photo*

¹ *The kitchen garden participants being trained on the sack gardens beside a newly established banana circle at the Livestock Café's kitchen garden in Chepareria (Photo by M Nyaga)*

The idea is also that with the engagement of community members, researchers within Drylands Transform and local agriculture officers, locally available vegetables, fruits, roots, tubers and legumes that are rich in micronutrients that the community lacks or doesn't get adequate quantities will be focused on, thus improving the nutrition of the different households that will set up the kitchen gardens and eventually influencing community nutrition.

2. NAMES OF THE PROJECT PERSONNEL AND CONSULTANTS INVOLVED

Name(s)	Dr. Stephen Mureithi		Researcher, University of Nairobi			
	William Makokha		Liaison Officer, Triple L Initiative			
	Margaret Nyaga		Obj 2 PhD Student, University of Nairobi			
	Alice Mwangi		Trainer in Permaculture Design Course (PDC), Regenerative Agriculture and Kitchen Gardening, Hillside Organic Garden			
	Jane Wegesa		Trainer in PDC, Regenerative Agriculture and Kitchen Gardening, Jjaja Regeneration			
	Caroline Kawira		Obj 3 PhD Student, University of Nairobi			
	Mercy Letting		Trainer and Extension Worker, Ministry of Agriculture, Livestock and Fisheries, Chepareria Ward, West Pokot County			
Dates of training	Start Date	13/06/22	End Date	18/06/22	Duration (Days)	6
Follow up activities		22/6/22		30/6/22		9
Destination Counties	West Pokot County					
Wards /Sub County	Chepareria Ward, Chepkopegh Location, Chepukat Village					

3. OBJECTIVES/AIM OF THE TRAINING

The practical training aimed to achieve the following objectives:

1. The establish a kitchen garden at the Livestock café' location which will serve for demonstration to the community members to replicate in their own homesteads.

2. To train men and women who can train other members of the community how to establish functional kitchen gardens in their homesteads (Training of Trainers).
3. To promote and demonstrate good permaculture, regenerative agriculture and agro ecological principles to food production.
4. To harvest and harness rainwater flow into the kitchen garden growing beds to promote production of food crops in the kitchen garden.

Training Approach

We shall apply various methods and design aspects to create diversified and resilient kitchen garden that takes advantage of micro-climates created by sunlight orientation, shade, slope, water flow, wind flow and orientation.

Various methods were applied in the Kitchen garden establishment methods:

1. **Site Survey, identification and demarcation**
2. **Sunken Growing Beds:** These were dug Half-moon shapes and along contour to have an advantage of rain harvesting and moisture retention. They were dug a depth of 30-35cm to allow space for the roots of the annual crops to be planted in the bed and to act as surface rain water reservoir. The half-moon were already arranged so as they any allow overflowing water to move to the next bed.
3. **Raised Growing beds:** These were created with the soil dug out from the half-moon and contour sunken beds. The soil was put into a mold of the same shape as the sunken bed- these mold were planted with crops that require less amount of water and that are drought resistant such as sweet potatoes, cassava and pigeon peas. Sunflower was also added to take advantage of the higher growing layer. Application of soil amendments – Mainly use of sand, wood shavings and manure to correct both chemical and physical fertility challenges of the soil on site
4. **Banana Circle:** Banana circle combines both rain water harvesting and in-situ composting. A hole almost a meter deep and 1 m wide is dug out in a strategic water way cutoff point. The soil dug out is heaped in two layers. The lower layer is planted with shade loving tuber crops such as short fruit trees arrow roots and coco yams. The top layer is planted about four banana plants and coupled with cover crops such as sweet potatoes and beans. The outer part of the mold is planted with cassava plants. The hole in the middle is designed to collect both water and composting materials such kitchen bio waste. The bananas will develop roots and take advantage of the moisture and fertility from the hole.

5. **Mulching:** Grass hay was used to ensure the bed are covered and the soil I not exposed to drying out or to wind blowing. Mulch as advantages of retaining moisture, keeping off weeds and adding nutrients to the soil.
6. **Planting methods:** Diversified planting was used with emphasis to plants that survive better in drier areas. The aim is to create a plant community that is layered and is working in complementation, a mix of both perennial, biannual and annual plants. Such a community will be resilient and enduring to the seasonality of the climate of the area. Direct and dry seeding was done for various legumes varieties that were planted such as bush beans, Dolichos lablab, cow peas, butter beans etc. It was also applied for maize, pigeon peas. Cuttings, splits, bulbs and seedlings were used such as sweet potatoes, cassava, ginger, arrow roots, cocoyams, turmeric, onions, garlic and other were also planted.

Below is the planting plan and plants varieties planted:

In the Sunken Bed	On the Raised bed (Mould)
High and Mid layer: Coloured maize, tomatoes, peppers Low and cover layers: Amarathas, Dolichos lablabs, night Shade, kales, ginger, cow peas, turmeric, arrow roots, coco yams	High layer-Sunflower, Cassava, pigeon peas Cover crop: cowpeas, sweet potatoes Herbs: Rose mary, lemon grass, colliander, sage, mints

7. Soil preparation and amendment

We noticed that the soil in the site was very compacted and shallow with estimated clay content of more than 50%. From the site onservation, it was clear that water permeability was low because soil was compacted resulting to a lot of run-off during the rains. The LDSF infiltration analysis carried out earlier by Objective 1 team also showed impeded permeability in Chepareria site with compacted top soils. Such physical characteristics negatively affect soil fertility. The soil surface for instance was hard and difficult for root of plants to spread. We dug out the soil for a depth of upto 35cm which was pretty much the depth of the top soil beyond which it either was murrum or rocky layer. The excavated soil was heaped for the raised beds. The soil was mixed with river sand and manure. The soil in the sunken was replaced by a mixture of sand and already composted manure.

The sunken bed was lined using a layer of sawdust to hold moisture and nutrients for the crops. Further treatment to the soil mix in the sunken beds may be required especially top dressing with nitrogen manure.

4. DESCRIPTION OF ACTIVITIES

Day 1:13/06/2022: Livestock Café site visit, surveying and designing of the Kitchen Garden area

The trainers, Alice Mwangi and Jane Wegesa visited the site for familiarisation discussion, site selection and designing of the kitchen garden area (Fig 1).



Fig 1: Sourcing of seedlings at Kitale, trainer's site visit and deliberations on the design of the kitchen garden area (Photos by M Nyaga).

The area selected is near the Caretaker's homestead for easier interaction and integration with the kitchen. It was decided that the type of micro-gardens to be trained on would be; Banana circles, sack gardens, contour sunken beds and half-moon semi-circular sunken and raised beds. This was due to the nature of the land since it is sloppy, highly degraded and vulnerable to high surface run-offs. There were also previous activities where half-moon water conservation

structures and soil bag contour lines of vertiver grass slips had been installed to reduce the speed of surface runoff in the area, thus complimentary when sunken beds are used.

Day 2: 14/06/2022: Participants' selection and training on Banana Circle establishment

The training attracted many people more than the programme could handle effectively. Quick brief interviews were conducted and 30 participants were selected for the Training of Trainers (ToT). The criteria for the selection was; one should be able to understand and communicate in Swahili which is a national language, should be progressive and willing to train at least five other community member on what they will have learnt. The target was to have 30 members of the community who would be trained as trainers of trainers since they were expected to train other community members who would not have made it to the training (Fig. 2). The starting point was a group of women called “Mother to Mother Support Group” which is composed of expectant and nursing mothers who come together to support each other. The trainers selected 15 members from the group. The other 15 members were selected among the other members of the community from the neighbouring villages from the three surrounding locations of Chesra, Chepkopegh and Pserum near the Livestock Café (Appendix 3).



Fig 2: Inception meeting before the training, participants taking notes during a theory session (Photos by M Nyaga).

The selected trainees were trained on how to establish a Banana circle on the first day (Fig. 3). The farm is made in a circular form along a slopy area or watercourse to capture the fast-moving water into one collection point and allow it to percolate slowly to the plants (Appendix 1). The various crops planted at the circle were; Pawpaw, Bananas, Sweet potatoes, Cassava, Lemon grass, Cocoyams and Citrus trees.



Fig 3: Measuring the Banana circle area near the caretaker's homestead, digging and planting various crops and mulching of the circle (Photos by M Nyaga)

The participants were also trained on sack gardening (Fig.4) which involves the growing of vegetables in sacks filled with sand and manure. The sacks were supported with some stones at the centre for aeration and the rest of the space was filled with a mixture of manure and sand at a ratio of 1:1. The crops planted in the sack garden were spring onions and kales.



Fig 4: Demonstration of sack gardening, filling up sacks with the mixtures of sand and manure and one of the trainees planting kales on one of the sacks (Photos by M, Nyaga).

Post-training Questions and Answers Session

After a whole day of a very intensive practical training, the participants had an opportunity for a wrap-up session involving feedback, and questions and answer session. Some key questions included:

Q1 “Why did we plant a pawpaw at the centre of the Banana circle instead of a Banana which requires more water” by John Ruto.

Answer: “Bananas produce many suckers which would fill up the space very quickly thus depriving other plants around the water for their growth?” By Alice Mwangi

Q2. “Can a Mango tree be planted at the Banana circle?” by Dickson Lokwamutol

Answer: “Mango trees are plants with a very extensive root system and have some allelopathic properties of inhibiting other plants from growing under the canopy. But they will be

planted in other sections of the garden with good spacing” By Alice Mwangi and Mercy Letting.

Q3, “What are the growing periods of Cassavas and Sweet potatoes” By Josephine Chebet.

Answer: “Sweet potatoes take around 3 months to grow and you know they are ready when you see their flowers withering and starting to dry up. The Cassavas take 6 months to 1 year to mature” by Mercy Letting.

Day 3: 15/06/2022 - Contour sunken beds

The activity involved digging sunken beds along an already established contour line with Vetiver grass (Fig.5).



Fig 5: Alice Mwangi demonstrate the contour line sunken bed during theory and practical training sessions (Photos by M Nyaga).

The sunken beds were made to be 1m wide and at least one foot deep for easier workability. This resulted in two beds, the sunken and raised bed (Fig.6). The raised bed was planted with crops like pigeon peas, sunflowers, sweet potatoes and cassava to provide a good ground cover. The sunken bed was planted with crops like cowpeas, amaranthus, black nightshade, cherry tomatoes, eggplant, garlic and ginger.



Fig 6: Digging of the sunken bed along the contour line, lining of the bed with sawdust and covering with a mixture of manure and sand, mulching of the beds and planting of various crops on the raised and sunken beds (Photos by M Nyaga).

Day 4: 16-17/06/2022: Converting half-moon micro-catchments into semi-circular sunken beds.

This was the second set of training. The activity involved converting previously installed half-moon water conservation structures at the site into semi-circular sunken beds by enlarging them to be at least one metre wide and one foot deep (Fig. 7-9).



Fig 7: Marking and digging of semi-circular sunken beds (Photos by M Nyaga).



Fig. 8: Lining of the beds with a layer of sawdust, mixing of sand, soil and manure for the beds and mulching the beds (Photos by M Nyaga).

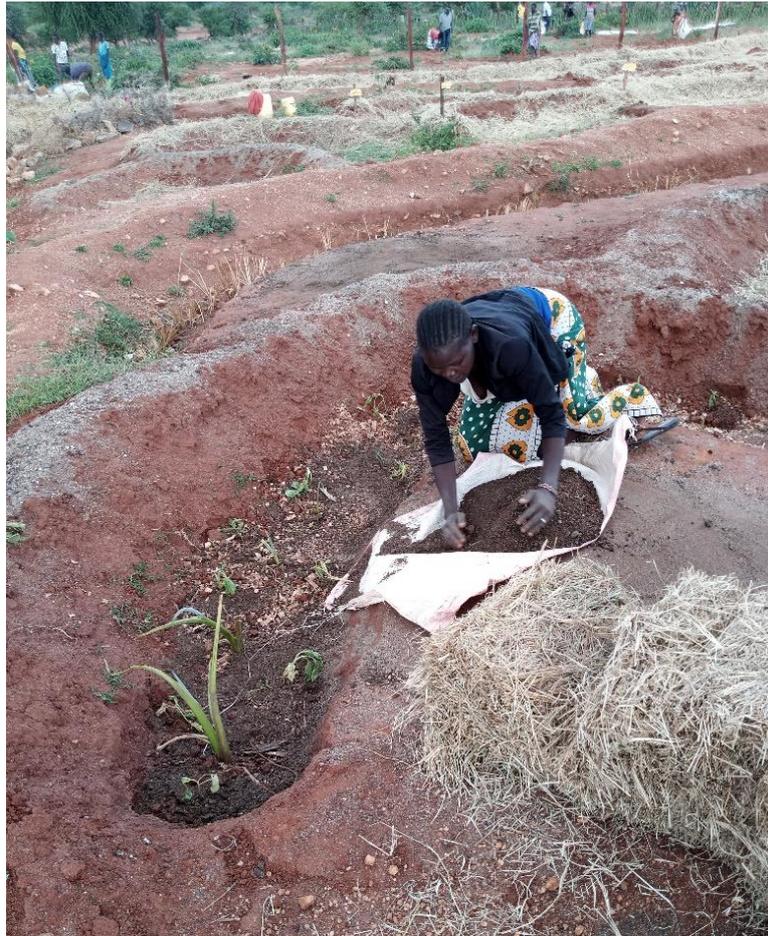


Fig.9: A woman trainee manuring a sunken-bed and other trainees planting various crops in the half-moon semi-circular sunken beds at the Livestock Café’s kitchen garden in Chepareria (Photos by M Nyaga).

Day 5: 18/06/2022 – ToT’s Banana circle and tree planting

On the fifth day, the participants were tasked to make their banana circle (Fig. 10) as a way of demonstrating what they learnt. Various fruit trees were planted in Zai pits at a depth of two

feet (Fig. 11). The various fruit trees planted were: Mangoes, Guava, Loquats, Syzgium, Avocados, Pawpaws, Mulberry, Neem, Prunus Africana, among others (See appendix 2).



Fig 10: Digging of a banana circle, planting of different crops in the banana circle (Photos by M Nyaga).



Fig. 11: Planting of various fruit trees (Photos by M Nyaga).

The Kitchen Garden Area



Fig 12. The transformation of the kitchen garden area in the Livestock Café in Chepareria (Photos by M Nyaga & S Mureithi).

5. WAY FORWARD

The ToT's were asked to follow up on the establishment of the crops for husbandry activities such as watering, weeding and additional manuring as necessary. The ToT's were also charged to practise what they learnt in their farms and each to train five other community members.

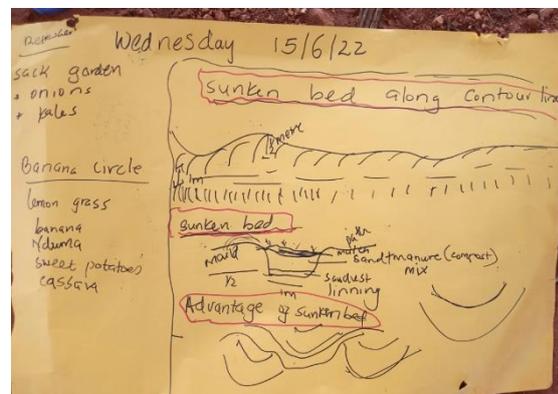
The trained group to be registered as a Community-Based Organization (CBO) since they have been trained in permaculture, regenerative agriculture and organic farming. The Agricultural Officer present, Mercy Letting was requested to channel training to other community members through the ToT's.

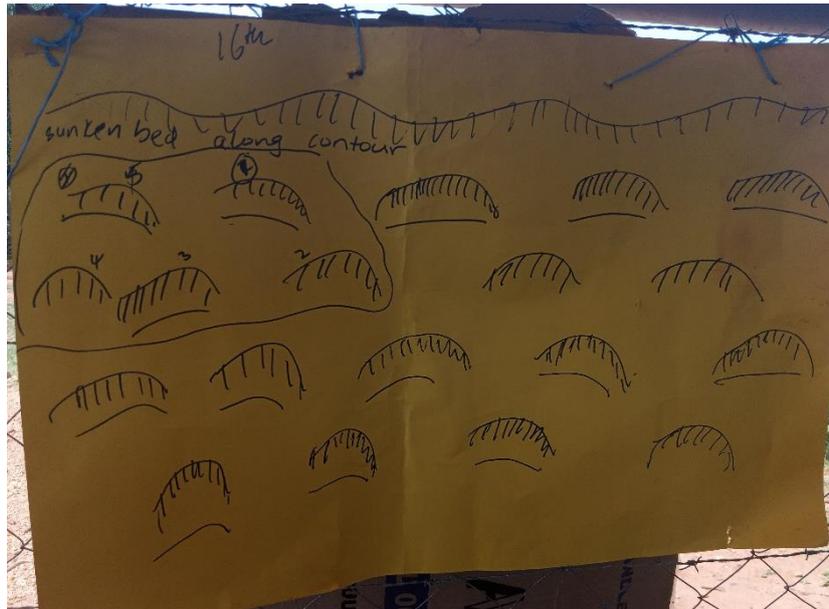
6. ACKNOWLEDGEMENTS

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7. APPENDICES

A. Demonstrations of the different gardens





Banana circle, Sunken bed along a contour line and half-moon sunken beds

B. Seeds and seedlings planted in the Kitchen garden area

S/No	Species name		
1	Amaranthus	29	Sage
2	Cow peas	30	Macadamia
3	Pigeon peas	31	Pomegranate
4	Cherry tomatoes	32	Avocado
5	Green grams	33	Tangarine
6	Artemisia	34	Lemons
7	Moringa	35	Oranges
8	Sunflower	36	Lemon grass
9	Butter beans	37	Mango
10	Red climber beans	38	White custard apple
11	Ginger	39	Pawpaw
12	Tumeric	40	Sweet potatoes
13	Garlic	41	Cassava
14	Pumpkins	42	Syzgium
15	Spring onions	43	Markhamia lutea
16	Black nightshade	44	Guava
17	Collards	45	Loquats

S/No	Species name		
18	Tomatoes	46	Colliandra
19	Kales	47	Neem
20	Spinach	48	Bamboo
21	Eggplant	49	Mulberry
22	Coriander	50	Coco yams-green and purple
23	Chives	51	Arrow roots
24	Thyme	52	Warbugia ugandensis
25	Hot pepper	53	Gravillea robusta
26	Bananas		
27	Jack fruit		
28	Rosemary		

C. List of participants (trainers of trainers) during Kitchen Garden training

S/No	Name	Gender
1	Stephen Yaran	Male
2	Solomon Pkopus	Male
3	Joel Lokodongor	Male
4	John Ruto	Male
5	Dickson Lokwamutol	Male
6	Dickson Molerinyan	Male
7	Johnstone Chilanyang	Male
8	Samuel Yerii	Male
9	Reuben Chumangole	Male
10	Harun Mutai	Male
11	Cheptikou Ngarinyang	Female
12	Violah Chemuok	Female
13	Ruth Chemusta	Female
14	Roseline Chemakit	Female
15	Gladys Chepatei	Female
16	Catherine Loyuwaluk	Female
17	Domitila Lokerie	Female

S/No	Name	Gender
18	Pauline Nawiy	Female
19	Josephine Chebet	Female
20	Regina Nangole	Female
21	Christine Ngorol	Female
22	Paulina Chepnyorio	Female
23	Agnes Lokemel	Female
24	Evalyne Lorinyang	Female
25	Irene Chepkorir	Female
26	Jeniffer Pius	Female
27	Mercyline Cheyech	Female
28	Eliza Tilokuo	Female
29	Damaris Chepengat	Female
30	Jackline Chemsto	Female