



Climate change adaptation and livelihoods enhancement learning event in Maobane (Hammanskraal). 7-8 August 2023



Background

The Adaptation Network's (AN) three-year Civil Society Organisations Skills Enhancement and Excellence Development (CSO SEED) project, funded by the Government of Flanders through SANBI, is aimed at building the capacity of the Adaptation Network's civil society members in the area of climate change adaptation.

Under the auspices of this initiative a capacity building training event was arranged for Mahlathini Development Foundation (www.mahlathini.org) to share their community based climate change adaptation methodology, climate resilient agriculture practices and livelihoods enhancement training processes with Sociotech (www.sociotech.co.za) and Sukhuma (a local NGO working in the Hammanskraal region outside Pretoria).

The Sociotech broad based livelihoods programme is fundamentally about self-determination, encouraging and enabling people to believe in their God-given ability and talents to implement their own dreams through own effort. It encompasses around 300 villages across Gauteng, North West, Mpumalanga and Limpopo.

The workshop was designed as a two-day process for capacity building of Sociotech and Sukhuma staff (12 field staff and operational managers) through running a community level process for 75 participants in One-in-Ten village in Maobane, Hammanskraal between the 7th and 8th of August 2023. (NOTE: We prepared for around 40 community members – a bigger facilitation team would have helped)

Learning outline

The event was planned jointly between the three organisations to refine the agenda for the two days to include climate change adaptation, production for good nutrition and value adding on the 1st day and seed saving, soil fertility (bed design and liquid manures), natural pest and disease control and fruit production (planting, pest control, pruning, cutting and grafting) on the 2nd day.

The venue was the Maobane community hall and a local homestead (Mrs Remotsa) in adjoining village for the gardening practicals.

The outline is shown in the table below

Table 1: Learning outline for Maobane: CCA and livelihoods enhancement

Training theme	Description	On site requirements	Off site requirements
Identification of training site	Inside and outside venues for learning sessions and demonstrations	- Hall or room with seating and electricity - Existing garden infrastructure for demonstrations (with permission to work there)	
Preparation of training site		-Access to tools for gardening, selecting demo site -A water source for watering beds and seedlings -Collect and deliver manure (4x50kg min), plant material (4x50kg min for dried and wet), dried grass for mulching (2x50kg min)	-Handouts for planting stations, -Inputs and demos for each planting station...
Nutrition and value adding (1 day)	-Inside sessions on nutrition and gardening for improved nutrition -Inside sessions on food preparation and value adding	-Training room, electricity, 60 chairs -Cooking stations, with tables, stoves, pots, utensils etc (x3) -Inputs and materials for cooking demos: Local produce (roughly 500g-1kg of ea if available- sweet potato, chilli, Spinach, other veg (carrots, cauliflower, peppers, brinjals....))	-Learning handouts, presentations, newsprint and stand, kokis, extension cables, data projector, posters, -Inputs for cooking demonstrations
Intensive homestead food production	Session split arriving at hall for seed saving input and discussion. Then move to a nearby garden, close to kraal with access to fruit trees for pruning. Seating arrangement for older people. Provision of manure, grass, organic matter, ash, tools, water...	-At hall: Seed saving input and discussion -At garden (with enough space, and at least one fruit tree (lemon, peaches, etc) Prepare for two demonstrations: 1: Fruit production and Natural pest and disease control (table close to tree), Enriched foliar spray, pest control plants and brews, pruning, grafting 2: Bed design and soil fertility: furrows and ridges, eco- circle, enriched foliar spray liquid manure	-range of seed packs for summer and winter planting -Presentation and handouts -Lime, bonemeal - Plants; herbs, multipurpose plants, vegetable seedlings, - shade cloth and poles for towers and keyholes -Some seed of legumes +/-grains -Some seedlings and multipurpose plants

The workshop

All sessions were conducted in Tswana with English translation. Power point presentations were supplemented by A4 colour visual aids and theme specific handouts. The latter included: nutrition and value adding, Climate resilient agriculture practices, enriched foliar spray, natural pest and disease control and fruit production.

Catering was not done for this event. Instead participants brought along their 'side hustles' including for example, small cakes, biscuits, snacks, drinks, bread, fruit and vegetables for sale during the workshop, or participants brought their own food.

1.1 CCA

Here we explored as a group what climate change is, the impacts of climate change on production and livelihoods, potential adaptation strategies and ideas and adaptive practices.

Within the group of participants, some were well versed with the concept of climate change as a change in weather patterns, with delayed rainfall and increased temperatures, caused by global warming. Others have as yet not considered the concept.



A summary of impacts mentioned by participants are:

- High variability in weather including cold in summer and rain in winter that did not happen before.
- Generally there is a lot of frost, but this winter has been quite warm.
- In the last few years there has been a lot of rain that has damaged crops.
- Very hot sun, causing damage to crops.
- Summer rains come later with higher rainfall later in the season. This causes problems such as with sunflower for example, later planting means the plants don't seed well and seed rots due to late season rain. In addition, there is a lot more bird damage than in the past.
- Garlic no longer does well due to late season rain, where the bulbs can not dry properly.
- Crops don't look good and there are more pests and diseases than before.
- There is an increase in stalk borer in maize.
- Boreholes are becoming salty, and crops grown with borehole water don't grow well. Also, the quality of water from the Magalies river, supplied in the community is not good and also affects crop.

Seasonality diagram were used to explore the changes in rainfall and temperature.

With respect to rainfall, the early spring rains in August-September no longer happen. There is much more rain later in the season (April/May). The 'slow' rain, gentle but ongoing rain, is not happening anymore. Now rain is more localised with intense thunderstorms that do damage to the environment and crops.

With respect to temperature, it is much hotter than before and crops suffer from both heat and water damage at the same time.

Potential adaptive strategies and practices mentioned include:

- Shade netting
- Mulching
- Changing irrigation times and practices
- Hydroponics
- Water and rainwater storage – e.g., Jojo tanks
- Planting different crops and trees e.g., Moringa which is adapted to heat and has small leaves.
- Use of greywater
- Use of boreholes
- Use of fertilizer (although this was contested by a number of participants).

Climate resilient practices already being undertaken:

- Deep trench beds
- Raised beds
- Furrows and ridges
- Micro tunnels (shade cloth tunnels)
- Mulching
- Mushing
- Minimum tillage and organic field cropping

1.2 NUTRITION AND VALUE ADDING

A brief review of nutrition using the go, grow and glow food concept, as well as proportions of servings per meal was done, as training has already been undertaken in this group.

This was followed by a focus on variety and looking at a range of potential legumes.

Samples of cooked legumes for tasting were provided, along with bread made in the local community (split peas green and yellow, lentils and chickpeas).

A range of traditional and heirloom legumes and grains were on display and available for participants to take home, including black beans, jugo beans, cowpeas, pigeon peas, red kidney beans, mung beans, jack beans and peanuts.

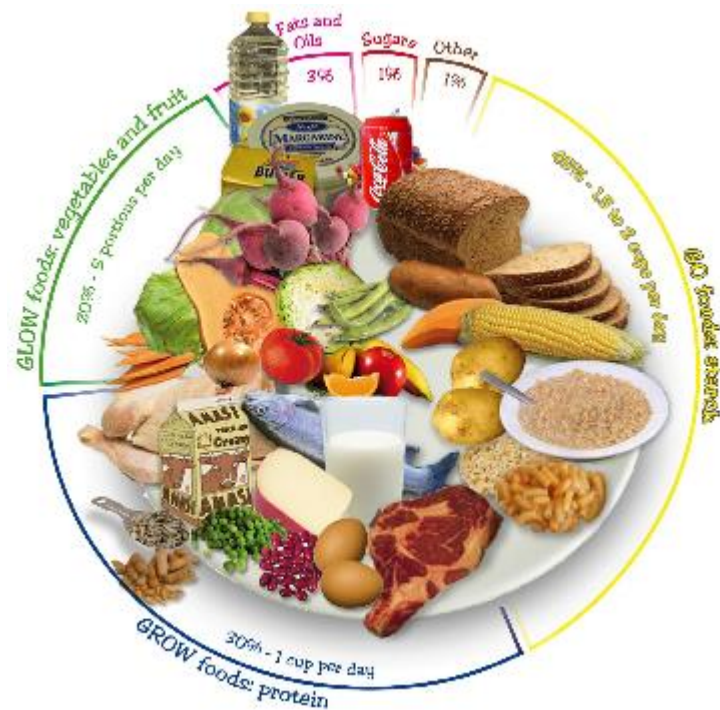


Figure 1: Above: Visual aid of go, grow and glow foods. Below: A table showing traditional legumes and crops for including variety into production and diets (Photo from Caroline McCann (STI)).



Value adding.

Here the focus was on requested practices, including drying and processing of common produce such as chillies and lemons.

The session consisted of demonstration's undertaken at different "stations", among which participants rotated. These included:

1. Blanching and drying of vegetables, using a do-it-yourself solar drying frame
2. Making lemonade and marmalade from lemons
3. Sweet chilli sauce
4. Vegetable achar
5. Sweet potato bites using orange fleshed sweet potatoes.

Below are a few indicative pictures.



Figure 2: Left: Caroline (STI) making and sharing lemonade syrup. Mpho (Sukhuma) demonstrating blanching and drying of vegetables and Betty (MDF) demonstrating making of sweet potato bites with a group of participants.

HIGHLIGHTS OF DAY 1 (from a quick review)

- We loved the session. It was so inspiring.
- We can now add value to produce that we had to throw away before. We can make lemonade and marmalade with our lemons. One participant even went home and made her own lemonade on the same evening.
- I have learnt about different ways to process chillies and can now add sweet chilli sauce to my small business.
- Achar is a great way to process extra cabbage and carrots.

1.3 SEED SAVING

The discussion was started by creating a list of seeds already saved in the community. These included maize, beans, cowpeas, butternut, pumpkin, chillies, green pepper, and tomatoes.

This was followed by an input on different types of flowers, and pollination – including for example complete and incomplete flower and self and cross pollination. Some time was spent talking through different ways in which pollination occurs- via wind and insects for example and the importance of conserving and promoting insect pollinators.

Good practices

- Conserving and restoring natural habitats
- Growing flowering crops and plants preferred by pollinators like mango, pigeon peas, nuts and many more
- Promoting mixed farming systems for plant diversity; establish nectar corridors, provide habitats alongside cropland

Pollinators are found wherever flowering plants flourish. An ecosystem with a wide diversity of plants harbours more pollinating species.



This was followed by an input and discussion on traditional seeds, open pollinated seed, hybrids and GMOs, emphasising the difference between these seeds.

We then focused on principles of good seed selection and also ways in which cross pollination can be minimised. We discussed annual and bi-annual seeding plants. It is important to grow a minimum of 10 plants of any crop which is kept entirely for harvesting of seed. None of the crop should be harvested and the bed should be a bit separate as seed set and drying can take much longer than the normal harvesting period.

Criteria for Selecting Seed



- At least 6 plants for in breeders and min 12-24 for out breeders
- Similarity to parent plants or having the desired characteristics – vigour, size, growth, but also disease resistance, heat or cold tolerance, colour, shape, taste etc. Remove undesired plants before flowering
- Only harvest seed from healthy plants
- Only harvest healthy seed
- Do not harvest seed from plants that have 'bolted' – early seeding due to stress
- Only harvest mature seed, immature seed will not germinate – usually colour change from green to brown, pods start to shatter, fruit is ripe or starts to disconnect from main branch easily

We concluded by discussing post-harvest pests and natural remedies for these by using for example ash, oil, lime and aloe in seed storage containers which should preferably be made of dark glass. Storage in plastic is not recommended.

QUESTIONS FROM PARTICIPANTS

- Why do male flowers die (*usually after pollination occurs, these flowers die back*)
- Can I plant 2 different types of tomatoes together (*Yes, tomatoes self-pollinate even before the flowers open, so it is reasonably safe*)
- What is the pink colour on bought maize seeds (*It is a fungicide – seeds are coloured so that people do not eat them as the fungicide is poisonous*)
- I use blue death on my seeds to stop post-harvest insects (*this is not advisable as blue death is very poisonous and also persistent in the environment.*)
- Why do you get white and yellow mixed cobs when you planted white maize only (*this is a good example of cross pollination from a wind pollinated crop. Pollen can travel up to 2-5km and thus what your neighbours plant affects your crop.*)

REVIEW OF LEARNING

As this session contained a lot of technical information a quick review of learning was undertaken at the end of the session.

- Save seeds from healthy plants only and take the most healthy-looking fruits and seeds for saving, rather than eating.
- We looked at different types of seed and seed longevity.
- We learnt about the male flowers of a maize plant, something we didn't know before. There is a habit of cutting off the male flowers, which we now understand will reduce pollination and seed set.
- We learnt when lettuce seeds are ready and to harvest them quickly before they "fly away".
- We learnt how to keep seed from spinach and carrots.
- We now know that pumpkins have both male and female flowers. This also means our habit of cooking the flowers reduces the production of pumpkins on the plant, something we didn't consider before.
- We learnt the better drying of seed prior to storage is important, also to reduce weevils in the seed.
- We learnt about using glass storage containers rather than plastic.
- Learnt that we can not plant different cabbages, broccolis and cauliflowers in the same place as they will cross with each other. And also, that beetroot and spinach should not be planted together if you want to keep seed as they will cross.
- We learnt how we can use paper bags to specifically pollinate different maize cobs to ensure seed that it true.

Figure 3: Insect pollination examples



Participants were provided with small packets of a variety of 'new' vegetables: Chinese cabbage, kale, marigolds, yellow pear tomatoes, paprika, parsley and coriander.

1.4 GARDENING PRACTICES

These gardening sessions were held in a homestead close to the hall. Participants were divided into two rotating groups to ensure better participation.

Enriched foliar spray

This was demonstrated to the group as a whole. The handout for this is shown alongside.

This spray is a good liquid fertilizer as it contains all needed nutrients such as N,P, K and micro nutrients in abundant quantities. It also has minerals, hormones and antibiotics in the mixture and builds up immunity of plants as well as protecting against common fungal and viral diseases.

The liquid is strained and diluted before use. The drum of liquid manure can be kept going by periodically topping up the manure and plant materials 2-3 times, before starting the culture from the beginning again.

Below is the demonstration in Maobane.

Enriched Foliar spray

This is a potent brew for improving plants' ability to cope with diseases and pests, through building the plants' immunity! It also provides a liquid feed to plants, as a foliar spray.

INGREDIENTS

- 30kg fresh cow manure
- 60L water
- 5L milk
- 5kg sugar
- 4kg wood ash
- 4kg bonemeal
- 3-5 20L buckets of weeds or banana stems
- 2-3kg agricultural lime

Figure 1: Chopping banana stems and weeds for adding to the brew



PREPARATION

- Chop weeds fine before adding to the rest of the ingredients in a large drum. Ensure that the drum has a lid and can be closed.
- Soak for 10- 15 days
- Filter before use and dilute with water at a rate of 1:4
- The brew can be topped up with manure and weeds 2-3 times, before starting with a fresh mixture.



Figure 2: 1. 30kg of cow manure to add to the drum. 2. Adding the lime and bonemeal while stirring the mixture. 3. The final brew.



Eco circles and Furrows and ridges.

These were demonstrated to the smaller groups and as well as mixed cropping and planting of multipurpose plants. For the latter a number of different plants were provided as examples: rosemary, lavender, Bulbine, organum, thyme, parsley, coriander, lemon grass, fennel and garlic chives.

Figure 4: An eco circle with the drip irrigation 2l bottle in the centre, planted with a selection of herbs (parsley, rosemary, and thyme for example) and mulched.



Natural pest and disease control

Here we started with discussing the need for a diverse garden containing multi-purpose plants, flowers, shrubs and trees to promote the presence of beneficial insects.

Below are some examples (bees, praying mantis, mayflies, wasps, ladybirds and spiders)



We continued by demonstrating a few pest and disease control brews including the well-known chilli and soap sprays as well as onion and paraffin and discussed other options such as using aloes and blackjacks. The group asked also about treatments for slugs, and we discussed 'beer traps' as well as insects that mimic each other, noting that there are small bugs very similar to ladybirds that actually eat plants rather than soft bodied insects such as aphids.



Figure 5: Different pest control brews, a beer trap for slugs and snails and a ladybird mimic which actually eats plant leaves.

Fruit production

For this session we focused on fruit tree maintenance, pruning, cuttings and grafting. Handouts were prepared and shared with the groups.

Regarding maintenance, trees should be planted with a generous amount of compost or manure with bonemeal and lime and not just put in the ground. The planting basins should be large enough to allow for at least 200l of water to be added for good deep watering of trees on a regular basis.

A few trees in the homestead provided good examples of common issues in pruning and grafted trees and these were used to discuss and demonstrate some of the best practice principles:

- A bought orange tree was planted in a shallow basin, not fertilized and watered incorrectly. In this case the lemon rootstock of the grafted orange tree survived but the grafted scion of orange died back, so that only the lemon remained. This is a reasonably common occurrence.
- Another issue with grafted trees if not pruned properly is that the rootstock can grow out and overtake the rest of the tree, as is shown in the picture of the mango where small seedlings are growing out underneath the main tree.
- If hard pruning of bigger branches is done, but the small branches are left – parts of the remaining stem often die back. It is important to remove a proportion of the smaller branches to provide space and food for the remaining ones, but not to hard prune the bigger branches too much, as shown for this peach tree.



Figure 6: A badly treated grafted orange tree, where the orange top or scion has died off, leaving a sickly lemon rootstock to grow. Mango rootstock suckers growing alongside the main tree, which should be pruned out and a peach tree which as pruned incorrectly, leading to partial die back of the branches.

The grafting session was extremely popular. Here we demonstrated the following principles:

- Grafting of like trees – thus orange onto a strong lemon rootstock or a stringless mango onto the wild ‘fish’ mango rootstock.
- The rootstock should be grown out in a bag until the stem is about finger thickness.
- Then the scion or top can be grated on using young branches around pencil thickness.
- The cut should be made with a very sharp blade at a diagonal angle, to allow for as much surface area to touch between the two stems.
- Parafilm grafting tape should be used, rather than any other plastic, as this allows ‘breathing’ of the seal without too much moisture.
- The tape should be stretched while wound on to allow for a secure binding.



- These grafted cuttings should be kept moist and cool for a long period – up to four months to allow for the graft to take properly. This will be obvious once the top starts producing shoots and leaves.

For cuttings the following information was provided, and examples of cutting were made from figs, mulberries and guava provided by a few of the workshop participants.

Cuttings are plant pieces, usually stems and branches that can grow new roots. Cuttings can be taken from deciduous trees (which lose their leaves in winter) such as peaches, plums, figs and mulberries. They can also be taken from other plants such as herbs and sweet potatoes.

Cuttings should not be taken when plants are stressed for example if they are very hot or cold or during drought. Shoots that are producing flowers or fruit should not be used for cuttings. Generally, there are two kinds of cuttings:

Softwood Cuttings	Hardwood Cuttings
These are “green” cuttings taken from new growth during the season.	These are older, woodier shoots from the previous seasons’ growth.
Cuttings are usually taken early in spring.	For deciduous trees: cuttings should be taken in the dormant period before buds sprout (winter). For evergreen trees: cuttings should be taken just before a time of rapid growth. (This is difficult to judge so you need to experiment).
Remove all but the top few leaves.	These cuttings have no leaves and usually tips should be removed. In general, use a relatively young shoot with many nodes.

1.5 WORKSHOP REVIEWS

Both STI and Sukhuma staff members as well as participants were extremely enthusiastic about the workshop and provided glowing reviews in terms of information shared and new learning. The rather large group of community level participants (75) attested to this and the 2nd day even more people attended.

Around 10 of the AN-SEED workshop review forms were also filled out. Below is a brief summary:

- **Overall workshop rating:** 40% excellent; 60% good.
- **Most enjoyable part (greatest to smallest):** Grafting of fruit trees, seed saving, value adding, the workshop as a whole, pruning.
- **Least enjoyable part (greatest to smallest):** Too many questions and not all answered, too much information in one day.
- **Most useful (greatest to smallest):** Grafting, foliar spray, facilitation tips, seed saving and eco-circles.
- **Suggestions for improvement:** It was an amazing workshop. The facilitation was excellent. Maybe choose only two topics for a day, shorter sessions – inputs for only 2 hours. Training should be in English, with translation given that not all people understood Tswana that well. There should be more interaction between facilitators and participants in terms of sharing knowledge (comment relates to STI and Sukhuma field staff) and provision of training for field staff separately – more in -depth.
- **Would you recommend this kind of workshop to others:** 100% yes.