Adapting our farming system to ensure a sustainable future

Sustainable agriculture implies producing our own food today without compromising our children's ability to produce even much more in the future. If we do not protect our natural resources, one day soon we may not be able to sustain our livelihoods and our children's future. If this happens, our children will never forgive us.

We must protect the environment that feeds us. We must protect our future.

While we have produced food crops through conventional tillage for many years, this has come at great cost to our environment and soil productivity with negative impacts on our households' food security. Conservation Agriculture offers us the best opportunity for climate change adaptation.
**Climate Change Consequences**

- Weather has become more unpredictable, less regular
- Intense drought
- Frequent flooding
- Soil erosion
- Greater impact of frost
- Delay of first rains
- Intense flooding
- Soil erosion
- Flooding

**Climate Change Adaptation: why is it urgent?**

- Adapt to unpredictable and erratic rainfall
- Reduce incidents of crop failures
- Improve food security
- Reduce poverty
- Improve food security
- Reduce poverty

**How do we adapt to Climate Change?**

- Install water-harvesting tanks and drip irrigation systems.
- Homestead vegetable cultivation (e.g., Keyhole gardening).
- Match planting times with the choice of your crops, to coincide with first rains.
- Conservation Agriculture (e.g., Likoti).
- Crop rotation and/or intercropping.

**Conservation Agriculture & Climate Change Adaptation**

Conservation Agriculture (CA) is one of the best adaptation techniques in Lesotho context and it is accessible to all.

The principles of CA are:

1. Minimum soil disturbance.
2. Permanent soil cover: crop residue or live mulch.
3. Crop rotation and/or intercropping.

We need to change our current practices so we can produce more quantity and quality food while improving the soil in our fields.
**The 3 Principles of Conservation Agriculture**

1. **1st Principle: Minimum soil disturbance**

Direct planting involves growing crops with minimum soil disturbance since the harvest of the previous crop.

Advantages of minimum soil disturbance:
- Protects the soil against erosion by water and wind.
- Inverses soil organic matter.
- Increases yield per unit of fertilizer or manure applied. Long-term decreases the amount of fertilizer per hectare.
- Cost savings: fuel, time, and labor in the long term.

**Conservation agriculture planters**

**Manual CA**

**Mechanical CA**
Mulch is any organic material such as decaying leaves, hay, or compost spread over the soil and around a crop to enrich and insulate the soil. Live mulches are crops intercropped for purposes of providing soil cover. Crop residue or live cover protects the soil from direct impact of erosive raindrops; conserves the soil by reducing evaporation; and suppresses weed growth.

Advantages of permanent cover: residues and live mulches

- Protects the soil from erosion by water or wind.
- Suppresses weed growth.
- Improves organic matter accumulation and carbon sequestration.
- Inhibits recycling of nutrients.
- Protects the soil from erosion by wind or water.
- Suppresses weed germination and growth.
- Improves water use efficiency.
- Increases water infiltration.
- Reduces soil erosion.

2nd Principle: Permanent soil cover with crop residues & live mulches

Crop rotation means that different crops are alternated in the same field, preferably cereal (e.g., wheat and barley) followed by legumes (e.g., beans).

Advantages of crop rotation & intercropping

- Improves nutrient cycling: Crops have different rooting patterns, which take up nutrients at different soil depths. Legumes fix nitrogen in the soil for the benefit of subsequent cereal crops.
- Improves pest and disease management: Different crops are susceptible to different pests and diseases. Therefore, growing such crops in rotation will reduce the incidence of pests and diseases at no cost.
- Improves water use efficiency: Crops with different rooting systems also utilize soil water at different soil depths.
- Improves soil structure: Organic matter from crop residues improves soil structure and water-holding capacity.

3rd Principle: Crop rotation and intercropping
• Spacing between basins may differ among crops.
• For maize, basins need to be dug every 75 cm in each line/row.
• Different lines should be separated by 75 cm.
• In dry areas, spacing could go up to 90 cm between basins and rows.
• Tie knots at 75 cm apart on a line to mark basin intervals.
• Layout each line with clearly marked spacing points for basins within the row.
• The next row is laid out 75 cm away using a home-made meter stick.

When using mechanical Conservation Agriculture planters, the distance between rows is the same as conventional farming: Maize and Sorghum, 90 cm between rows; Beans, 60 cm between rows.

**STEP 1: Field layout**

Plan for measuring and laying out the basins. 1 Basin

**STEP 2: Preparing the planting basins [July – September]**

The basins are 15 cm long x 8 cm wide x 10 cm deep. If using compost, basins can be 15 cm deep.

**STEP 3: Adding fertilizer and/or compost [September – November]**

Fertilizer is banded by hand in the bottom of the basin and covered with soil.

- Measured in coke-cola caps 2, like bottle caps, a 2:3:2 mix of 1 cup up to 3:2:1 mix of 1 cup is needed per basin for fertilizers 3:2:1, 2:3:2, 6:2:1.

Compost application:
- Add 1 or 2 handfuls of compost in the basin and cover with soil.
STEP 4: Planting [September – November]

- **Maize/Beans:**
  - Plant 2 - 3 maize seeds and 6 - 9 bean seeds per basin (well spaced, not in a heap) and cover seeds with clod-free soil. Beans can be planted in rows between maize lines.

- **Sorghum:**
  - Plant 8 - 10 seeds of sorghum (pinch between fingers) per basin and cover with clod-free soil.

- **Winter Wheat:**
  - Wheat can be intercropped between maize lines from late April until the end of May.

STEP 5: Manual weeding and thinning [October – February]

- **Maize/Beans:**
  - Plant 2 - 3 maize seeds and 6 - 9 bean seeds per basin (well spaced, not in a heap) and cover seeds with clod-free soil. Beans can be planted in rows between maize lines.

- **Winter Wheat:**
  - Wheat can be intercropped between maize lines from late April until the end of May.

Time-lapse weeding is very important and must be done as frequently as necessary.

- **First weeding:**
  - As soon as weeds start emerging.
- **Second weeding:**
  - 4 - 6 weeks after crop emergence.

Proper weeding of your land results in higher crop yields, which in turn means more food for your family.

**Note:** It is strongly recommended to keep fields free of weeds.

STEP 6: Top dressing for maize & sorghum [January – February]

- **Maize/Sorghum:**
  - When top-dressing, use a minimum of one (maximum two) heaped coca-cola caps per planting basin.

- **Nitrogen (N) fertiliser:**
  - When maize or sorghum crops have reached knee height (not for beans).

STEP 7: Planting cover crops [February – May]

- **Grazing Vetch, Oat, and Wheat:**
  - Spread Grazing vetch and Oat seeds February - March (and Harvest April - May) after tasseling, when plants have already formed cobs.

  Grazing vetch is one of the best options to provide cover, suppress weeds and improve soil quality. It decreases need for nitrogen fertilizer and is sustainable because it is self-seeding. It can stand light cutting for fodder or grazing in the early spring, allowing for force-feeding and seed then eaten in summer or fall once it is planted, there is no need to buy seeds again.
Livestock Integration:

Animals should not be allowed to eat the organic matter in the fields. The presence of cattle in the fields also contributes to compact the soil and this should be avoided. 30-50% of the crop residues can be used to stall feed the animals.

• Cut off the tassel for livestock feed.
• Harvest the cobs and leave stalks standing in the field.
• Cut and spread stalks in the field between rows.
• Harvest the cobs and leave stalks standing in the field.

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