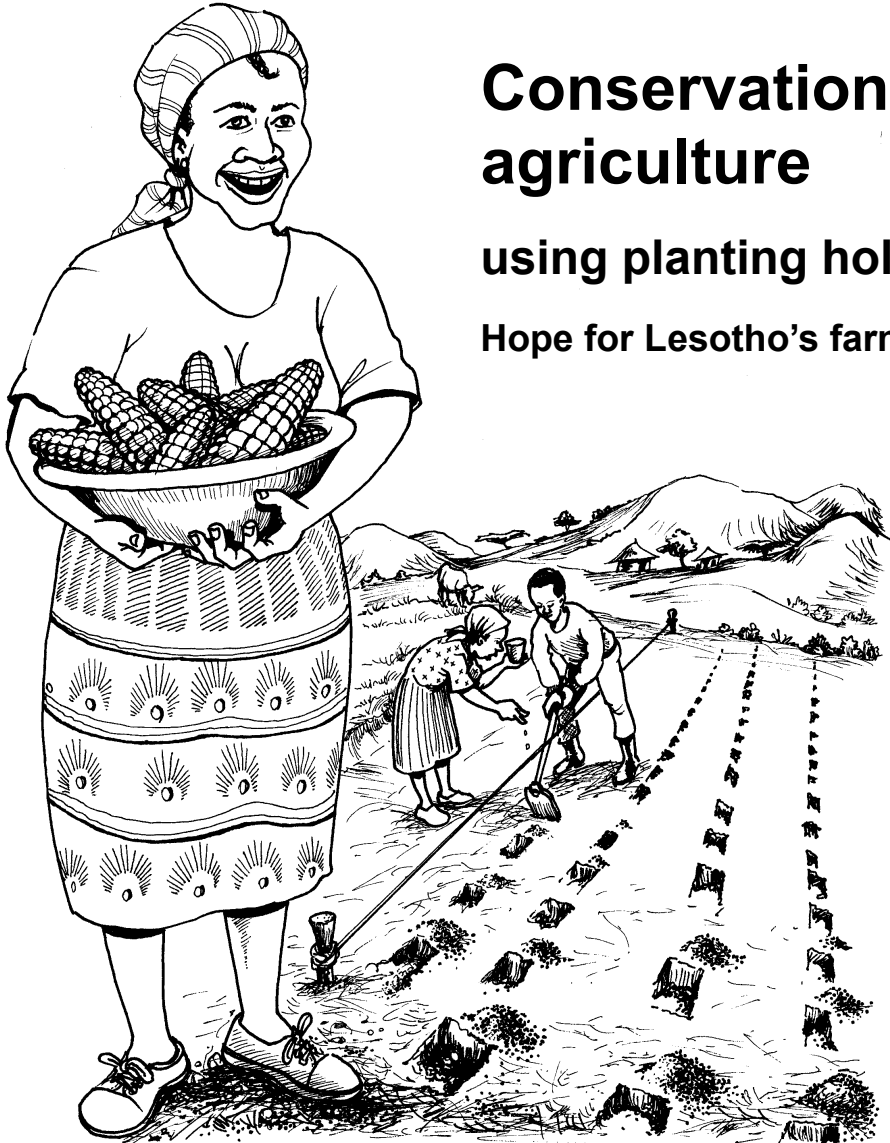




Conservation agriculture

using planting holes

Hope for Lesotho's farmers



Growing Nations, Tebello, Qacha's Nek, Lesotho

Conservation agriculture is a way of farming with nature, not against it. It produces good yields on soils that are easily eroded or that farmers thought could produce nothing. It prevents erosion that is eating away at Lesotho's precious topsoil. And it improves the soil, so harvests are better year after year.

The three easy principles of conservation agriculture

1. Disturb the soil as little as possible

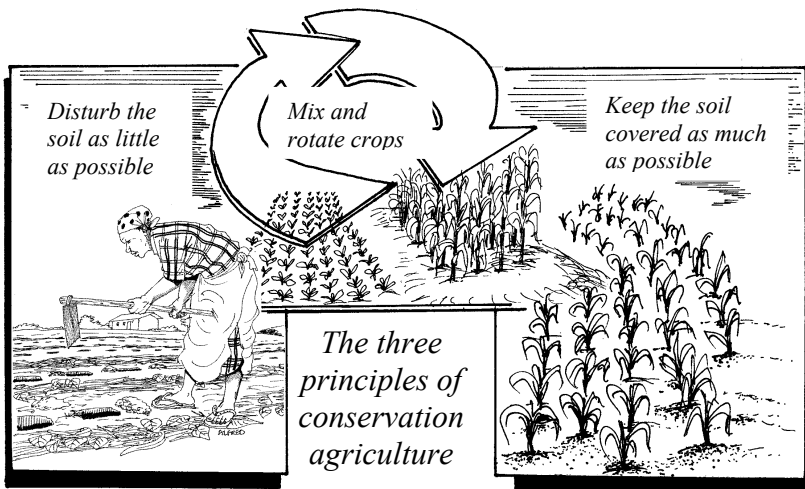
- Ploughing or hoeing turns the soil over. It destroys the natural soil structure, and creating a hard layer that roots cannot push through.
- Conservation agriculture breaks through the hard layer, letting water to seep into the soil and allowing roots to grow down.

2. Keep the soil covered as much as possible

- Ploughing exposes the soil to the rain and sun. The soil is washed away easily by heavy rain, causing erosion. Dongas are eating their way into Lesotho's precious soil like hungry hyenas.
- Conservation agriculture protects the soil surface and prevents erosion. With conservation agriculture, dongas can be a thing of the past.

3. Mix and rotate crops

- Planting the same crop season after season allows pests, diseases and weeds to multiply. That means lower crop yields and a monotonous diet.
- Conservation agriculture mixes and rotates crops to break the life cycle of pests, diseases and weeds. The result: higher yields and a more varied diet.



Benefits of conservation agriculture

Conservation agriculture helps you and your soil in many ways:

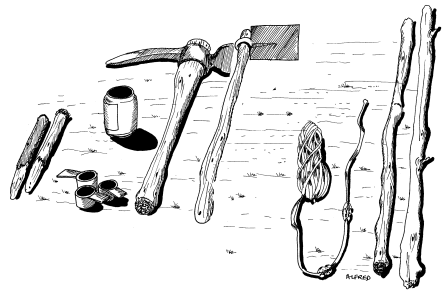
- It is cheaper because you do not need to hire animals or a tractor.
- It allows rainwater to seep deep into the soil, and then keeps it there so crops can use it.
- It stops soil erosion by protecting the soil surface.
- It improves the soil structure: it breaks down the hardpan and it makes the soil looser, making it easier for roots, water and air to penetrate the soil.
- It increases the amount organic matter in soil. The soil is richer and darker, and there are more earthworms, beetles and other creatures that help keep the soil fertile.
- It improves soil fertility. More organic matter means more nutrients that plants use as food.
- It produces healthy crops, which give good yields.
- It produces a range of different crops, which give you a balanced, healthy diet.
- Conservation agriculture means more work at the beginning because you have to dig planting holes and spend more time weeding. But the amount of work goes down the next year, and the year after.

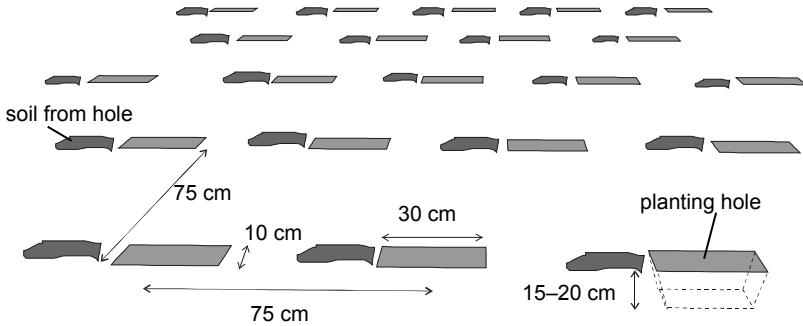
How to do conservation agriculture

You can do conservation agriculture in many different ways. If you have a tractor, you can use a no-till planter to plant crops directly, without ploughing first.

But you don't need expensive equipment to do conservation agriculture. You can make planting holes instead. All you need is:

- Two straight sticks, each exactly 75 cm long (to measure the distance between the rows).
- A piece of string, marked with paint, knots or bottle-tops clamped onto the string every 75 cm. The string can be any length, but it's a good idea if it is the length of your field.
- Hand hoe (to dig holes).
- Two small sticks or pegs (to hold the ends of the string).
- An 8-gram measuring cup, or a bottle-top from a 1 litre fizzy drink bottle (to measure artificial fertilizer). Or small can of fizzy drink (340 ml)
- Fertilizer (compost or artificial fertilizer) and seed.
- The will to work!





Measurements of holes and spacing

Digging planting holes

1. Before the start of the planting season, stretch the string across the field, across the slope, and fix both ends in place using the two pegs. Keep the string well clear of the ground so that it stays straight despite any vegetation. The knots or bottle-tops mark where to dig each hole. They act as guides for accurate spacing, since you will use the same holes again and again in the following seasons.
2. Starting at the first mark at one end of the string, dig a rectangular hole about 10 cm wide and 30 cm long (about the size of a man's foot). The hole should be 15–20 cm deep (about as deep as your hand). If there is a hardpan, make sure you dig deep enough to break through it. At the next mark on the string, dig another hole the same size. The marks on a string should be at the centres of each hole. Work backwards along the string so you do not tread on the holes you have already dug.
3. When you reach the end of the row, use the sticks to measure a distance of 75 cm to the next row. Move the pegs and stretch out the string again between them. Stagger the holes so they are diagonally (and not directly) opposite the holes in the previous row. This will help catch more rainwater and stops it from running away down slope.



4. Continue moving the string to mark out new rows and digging holes until you have finished making holes over the whole field. You should end up with holes 75 cm apart (from centre to centre), in rows that are also 75 cm apart.

Planting

1. If you use artificial fertilizer, put a bottle-top-ful (8 grams) of 3:2:1 (or 2:3:2) fertilizer in each hole. If you use compost, put 2 handfuls (or 2 can full) into each hole.
2. Cover the fertilizer or compost with soil from the pile next to the hole.
3. Plant the seed. Make sure you use the right number of seed and plant it at the right depth (see table).
4. Cover the seed with the rest of the soil from the pile. Make sure there are no lumps in the soil. Fill the hole completely so water cannot collect in it.
5. Step on the loose soil to make sure the buried seed is in close contact with the soil.

Crop	Number of seeds per hole	Planting depth
Maize	3 (then thin out to 2 per hole when the plants are knee-high)	5 cm
Sorghum	10 (then for some varieties, thin out to 6 per hole when the plants are knee-high)	5 cm
Beans, peas	5–8	3 cm
Wheat	20 seeds (1 pinch between thumb and two fingers)	3 cm
Sunflower	6 (then thin to 4 per hole when the plants are knee-high)	5 cm

Table 1. How to plant different crops

Compost

If you want to use compost, this is how you do it:

1. Collect green plants and put them down in a knee high layer.
2. Put 30 cm of kraal manure mixed with ash on top of the green plants.
3. Lay poles on top to ventilate the compost. They will also help when you have to turn the compost heap.
4. Lay green plants again, in the same height as the first layer.
5. Lay kraal manure in the same height as before.
6. Continue with layers of green plants and kraal manure until you have a big heap.
7. Keep watering every day.
8. If you have orange peels, rotten fruit etc. put it on the compost heap.
9. Turn the compost heap after six weeks.
10. Keep watering every day for six weeks.
11. Leave it for six weeks more and it is ready.

You should make your compost in November when there is a lot of green grass.

Mulch

1. Leave the straw from the previous crop on the field so it covers and protects the soil.
2. When you weed, leave the dead weeds on the soil too.
3. If possible, at the third weeding, sow a cover crop or oats, wheat or legumes in between the rows of the main crop. Scatter the seeds on the ground, then hoe them.

Weeding and fertilizing

1. Weed the fields immediately after planting using a hoe. Leave the dead weeds in the field to cover the soil and act as a mulch.
2. Weed again when the weeds start regrowing, and again if necessary later in the growing season. Leave the dead weeds in the field to act as mulch.
3. Thin out maize or sorghum when the plants are knee high.
4. For maize or sorghum, top-dress with a bottle-top-ful of LAN or urea fertilizer per hole. Put the fertilizer about 20 cm away from the plant upslope from each hole. If it is not raining, cover the fertilizer with a little soil.
5. Check the crop for pests and diseases. Control them if necessary.

Harvesting

1. For maize, sorghum, sunflower and wheat, harvest the yield and leave the stalks standing. For beans and peas, spread the straw over the field after threshing.
2. Plant a winter crop of wheat, oats or peas in the same holes as for the previous crop. You can tell where the holes are from the stalks in the ground.



How to get started

Try out conservation agriculture in your garden or on a small part of your field first. That will help you learn what to do. If it works, you can gradually convert your whole farm to conservation agriculture.

Changing lives

Molahlehi and his wife Mabatho Maqalika started conservation agriculture in their garden in 2001. It was a success there, so they tried it out on their fields in the next year. Using ploughing, they harvested only 400 kg of maize from the fields. With conservation agriculture, they were able to harvest 450 kg of maize, plus 200 kg of beans and 200 kg of sunflower on the same fields. They have enough to eat, and can even sell a part of their yield.

Molahlehi and Mabatho's lives have changed. They can now send their daughter to high school – which would have been impossible without conservation agriculture.

Avoiding mistakes

Here are some common mistakes in conservation agriculture, and how to avoid them.

Digging planting holes

Dig holes in lines across the slope. If your lines go up and down the slope, the rain will wash the soil away easily, resulting in erosion.

Stagger the holes. Don't let the holes line up down the slope, as the water will run between them. Make them in a diagonal pattern so they catch water running down the slope.

Make the holes the right size. Making holes too big is a waste of effort and disturbs too much soil. Use a hoe, not a spade! The first time you dig the holes, you may have to dig them deeper than this to break through the hardpan. But then back-fill the holes again to a depth of 15–20 cm to get the right planting depth.

Dig the holes the right distance apart. There should be 75 cm from the centre of one hole to the centre of the next one.

Planting

Rotate your crops. If you plant the same crop year after year, it will get diseased easily. The rotation also helps because some plants are able to fix nitrogen from the air and put it into the soil. Plant a different crop each season.

Plant on time. If you plant too late, the crop will not be mature when the frost starts, and you will get no yield. Conservation agriculture helps you plant on time, as it's not necessary to plough.

Plant at the right depth. Plant at the correct depth for the crop you are planting: 5 cm for maize, sorghum and sunflowers, 3 cm for wheat, beans and peas. If you plant too deep the seeds cannot germinate. If you put too shallow, the birds can eat them.

Use the right amount of seed and fertilizer. If you use too few seeds or use too little fertilizer, you will get no yield. If you use too much fertilizer, you will waste money. If you use too many seeds, the plants will compete with each other, and you will get no yield.

Keep the seed and fertilizer separate. If the fertilizer touches the seed, it will burn the seed. Put the fertilizer in the hole first, then cover it with soil. Then put in the seeds, and cover them with more soil.

Break up big clods. If you leave big clods in the hole, the seedlings will find it difficult to come up. Break up big clods before covering the seeds with soil.

Fill the hole completely after planting. If water collects in it, the seeds will be drowned.

Weeding

Make sure you weed properly. If you do not weed, you will get no yield! Crops need water, sunlight and nutrients. Weeds need the same things. They will compete with your crops. Use a hoe to scrape the weeds. Don't dig into the soil.

Leave the dead weeds in the field. Do not take dead weeds out of the field. Leave them on the soil as mulch (*kobo*).



After harvest

Leave crop residues in the field. After harvest, do not take the crop residues away. Leave them as mulch (*kobo*) to keep the moisture and control weeds.

Keep animals away. Do not allow animals to graze on your field. They will remove the mulch and compact the soil.

Where to get more information

Go to visit farmers who are practising conservation agriculture. Ask them for advice.
Contact:

- Growing Nations (in Tebellong Qacha's Nek)
- Dihlabeng Church (in Butha-Buthe)
- Dorcas Aid (in Mafeteng)

Or contact the following: