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Good Agricultural Practices for Potato Production in Cameroon

Demonstration guide

Green Innovation Centres for the Agriculture and Food Sector Project (ProCISA)

LEGAL INFORMATION

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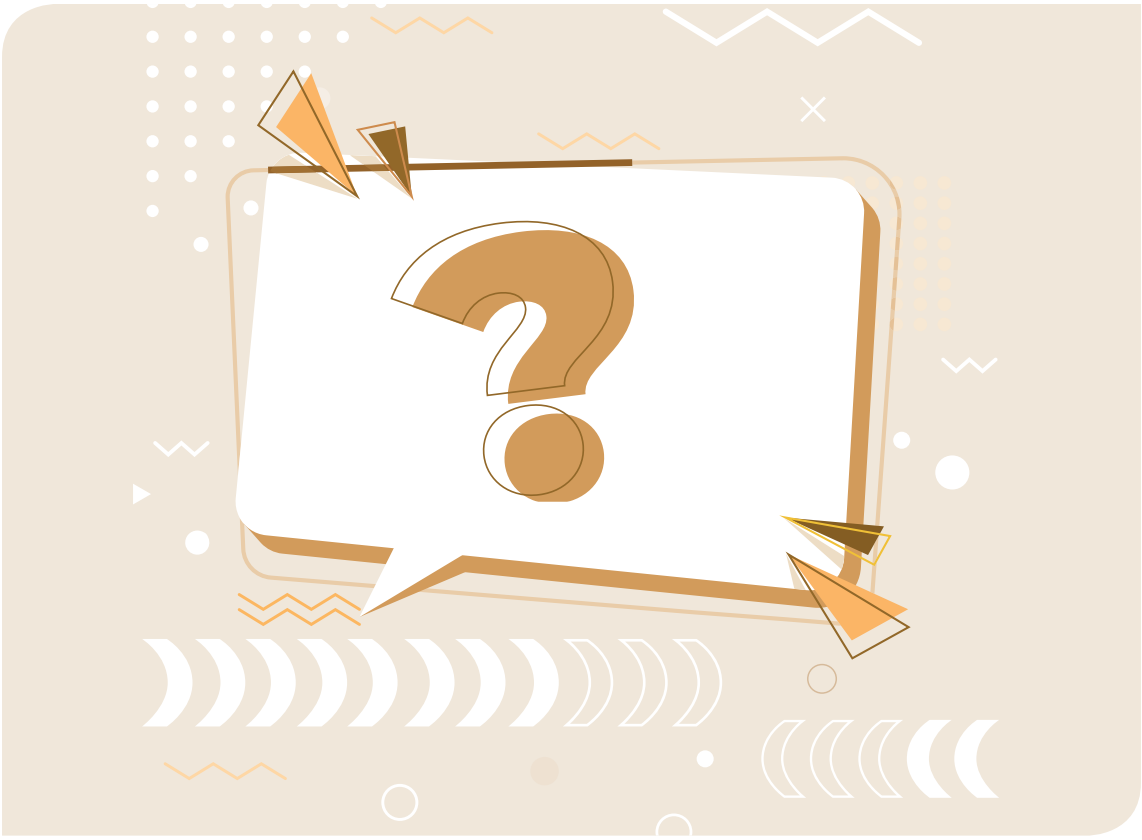


How to use this guide

This guide is a complementary tool that supports other training materials on ware potatoes and seed potato multiplication. Therefore, it is not meant to be used alone. The objective of this demo guide is to help the trainer to organize and facilitate hands-on demonstration sessions in the field. It contains three demos: crop husbandry, positive selection and the small plot technique for seed multiplication. For each demo, the guide tries to answer the following questions: What, Why, When, For how long, With what, and How. The How contains both text and images to clearly illustrate each demo session.

For each demo session, the trainer should take into account the following four successive steps: (i) an introduction or brief reminder on the subject; (ii) the practical demonstration in accordance with this guide; (iii) a question-and-answer session; and finally (iv) an update for the next training session.

DEMO 1

CROP HUSBANDRY

Several demos on crop husbandry will be carried out through a field trial with the aim to show farmers the importance of using good quality seeds. To do this a field trial will be installed with two seed plots using seeds of two contrasting qualities: good seed versus bad seed. It is recommended, for fair comparison, to use, as far as possible, the same variety for both plots.

Demo 1.1. Planting techniques

What

Setting up the field trial.

Why

Provide hands-on training on potato planting.

When

At the beginning of the growing season.

For how long?

120 minutes for planting, but the trial spans the entire cropping season.

With what

- Many small/thin hoes (one per participant),
- 1,100 seed tubers (35-55 mm diameter) of high quality seed (G1 or G2),
- 1,100 seed tubers from the market,
- 500 kg of animal manure,
- Mineral fertilisers (32 kg of YaraMila and 8 kg of YaraLiva),
- Fungicides (see training manuals),
- Insecticides (see training manuals),
- 1 measuring tape, and
- 1 rope for marking the borders of the plots (delimination).

How

Prepare two small plots of 20 m x 12 m each. Preferably use a terrain that has not been used for potato or any other crop in the same family for the past three years. Ensure that there is a distance of at least 2 m between the two plots.

For each plot, open 15 furrows with a spacing of 80 cm. If the terrain is steep, make the furrows perpendicular to the slope to minimize the effects of erosion and maintain run-off water within plant rows. In each furrow, place successively the manure, mineral fertilisers and tubers at 30 cm. For each tuber, place about 125-250 g of manure. In practical terms, the manure collected with the two hands of an adult is applied to 2-3 seed tubers. For the mineral fertilisers, mix 32 kg of YaraMila with 8 kg of YaraLiva. Add the equivalent of the content of a Fanta cap of this mixed fertiliser on the top of the manure. A second cap of the mixed fertiliser is applied as topdressing right after plant emergence.

Once the fertilisers have been applied, carefully place the tubers so as not to break the sprouts. If possible, avoid putting the tubers in direct contact with manure and fertiliser. In total, each plot will need 1,000 tubers which must be well covered with enough soil (10-15 cm above the tuber). Do not waste your time placing tubers with the sprouts in upright

position. The sprouts emerge without any noticeable delay regardless of their position.

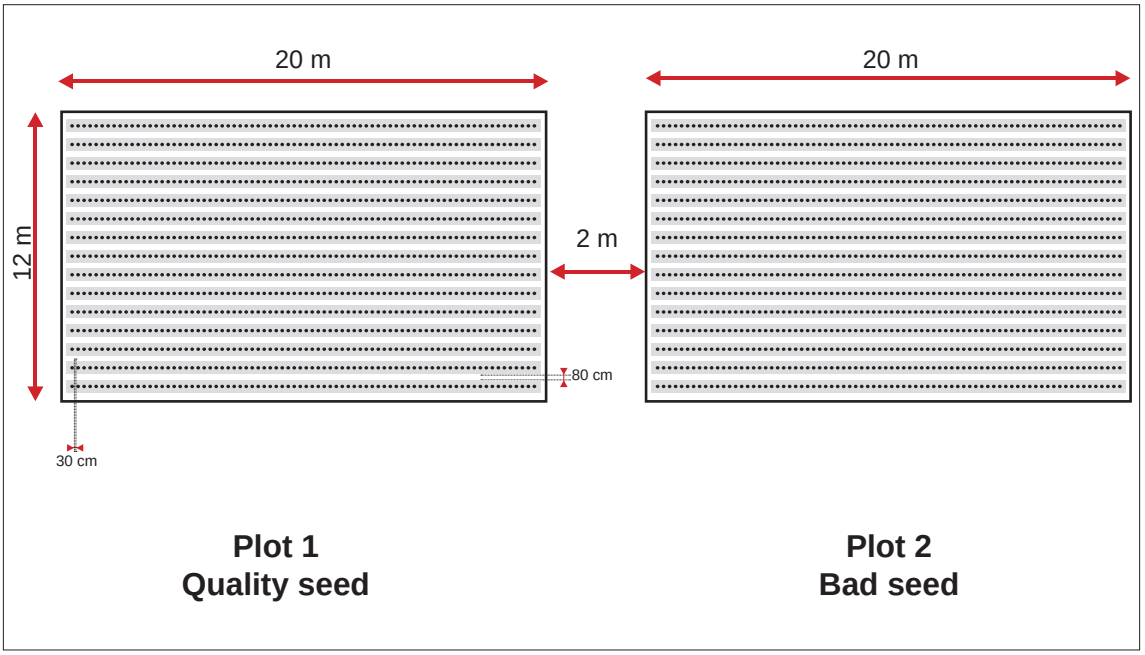


Figure 1. Experimental design

Demo 1.2. Hilling-up

What

Hilling-up potato crop.

Why

Avoid tuber yield reduction.

When

2 - 3 weeks after plant emergence.

For how long

60 minutes

With what

Small (thin) hoes (one per participant).

How

The hilling-up of the potato crop is done with a small hoe, narrower than a normal hoe. Stand between two adjacent potato rows. Move backwards as you remove soil from the furrow onto the rows/hills to the two sides. After the demonstration, ask the participants to practice in turn. To avoid risks of contamination, hilling must begin in the plot with healthy seeds and end with the bad seed plot.

Figure 2. Good practice for hilling-up potatoes.

Demo 1.3. Identification of pests and diseases

What

Field identification of pests and diseases as described in the training manual.

Why

Pest and diseases reduce yields and spoil the quality of the potatoes.

When

5 – 6 weeks after plant emergence.

For how long

60 minutes.

With what

- Pieces of white paper (one per participant),
- 1 clean glass,
- 1 small sharp knife, and
- Clean water (250 ml).

How

This demo on identification of pests and diseases is done in the bad seed plot. This is indeed where we expect to find more pests and diseases compared to the plot planted with healthy quality seeds. Please use the Trainer Guide to help identify the different pest and diseases. Carefully observe and discuss with the participants the identification and management of any pest and disease present in the plots.

Some diseases can be easily identified in the field. This is the case for late blight, bacterial wilt, blackleg, leafroll virus and mosaic viruses. Late blight, blackleg and leafroll virus can be identified with the naked eye. For the mosaic symptom, pass a piece of white paper under a leaf with the suspected symptom. Diseased leaflets will appear translucent and yellowish whereas healthy ones remain opaque and dark green. This test is usually done in full sunlight.

To accurately identify bacterial wilt, uproot the wilting plant and cut a small piece of the stem base (e.g., 5 cm long) using a sharp knife. Hold the piece of stem base with the hand or the tip of the knife partially immersing it in a glass of clear water. Hold still and wait approximately 2 minutes. If the bacteria ooze out of the end of the stem and move downward like a white smoke it means that the plant is infected by bacterial wilt as there is no other disease known to produce this phenomenon.

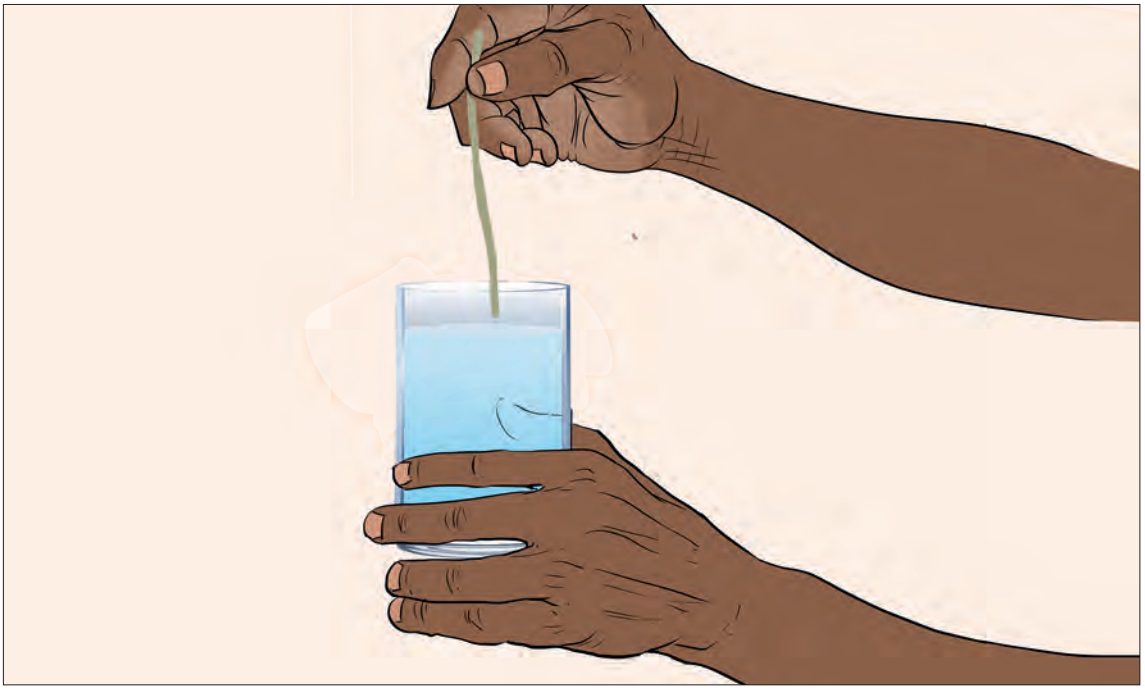
1 Identify a wilting plant

2 Check that the plant stems are not cut

3 Uproot a stem

4 Cut off a piece of stem base

5 Immerse the stem base into water



6 Hold still and observe if the bacteria ooze out of the end of the stem

Figure 3. Glass test for identification of bacterial wilt.

Demo 1.4. Roguing

What

Removal of unwanted plants.

Why

Maintain a high-quality crop.

When

To be combined with the identification of pests and diseases (Demo 1.3).

For how long

10 minutes

With what

- 1 normal hoe,
- 1 bucket/basket or any other container that does not permit soil to leak, and
- 1 peg (1.5 m long).

How to

The practice consists of inspecting the field, identifying and uprooting any abnormal plants, including tubers and roots. The plants to be rogued are either diseased (e.g. bacterial wilt) or off-types caused by varietal mixture at planning and volunteers growing from unwanted tubers. Field inspection works well when done early morning, while walking away from the sun for better identification of abnormal plants. It is not recommended to inspect the field in the afternoon as the leaves may naturally appear wilting without any diseases.

If a plant is confirmed to be infected with bacterial wilt by the glass test, uproot the entire plant along with the soil in which it was planted (all foliage, roots, tubers and soil). Take it out of the field and throw it into a deep pit. In case there is no pit available for disposal of diseased plants, ensure that the plant and soil are put in a place where there is no risk of contaminating agricultural land, including your neighbours' fields.

1

2

Figure 4. Good practices for roguing plant with bacterial wilt.

Demo 1.5. Dehaulming

What

Removing or destroying the potato foliage before its natural death.

Why

To ensure that high quality seed tubers are harvested and that they maintain quality after storage.

When

2 weeks before harvest, when the foliage begins to turn yellow in the plot that used quality seed.

For how long?

30 minutes

With what

1 sickle or machete.

How

This demo is done in the plot with quality seed. Smallholder farmers may dehaulm using tools such as a sickle. Others pull out the potato plant while stepping around its base to prevent tubers from coming out as well. Tubers remain in the soil while the potato foliage is removed from the field. Since the field trial aims at comparing yields, do the practice on a small corner of the plot. To do this, invite each participant to pull out a plant and then cut a second plant with a sickle. For a fair comparison of yields between the two plots, ask the participants to do the same in the second plot. This means that they must dehaulm the same number of plants in both plots.

Before concluding the demo, give the participants an opportunity to discuss and to learn from each other. Information related to tuber size and quality is analysed and discussed at harvest (Demo 1.6).

1 *Method 1*

2 *Method 2*

Figure 5. Two methods used by farmers for dehaulming.

Demo 1.6. Harvesting and grading

What

Harvesting the trial.

Why

Comparison of yields obtained.

When

Just after total death of the foliage.

For how long

180 minutes

With what

- 50 empty bags, size for 50 kg,
- 1 weighing scale with a capacity of 100 kg,
- 1 potato grading device (Hole diameters: 30 and 55 mm),
- 2-3 hoes, and
- 50 small pegs (30 cm long)

How

Before organizing a demo on harvesting, make sure it is not going to rain. This demonstration corresponds to the harvest of the two trial plots, starting with the one planted with quality seeds. Harvest the plants by hand, one by one. If the soil is too hard, use a hoe to loosen it.

Once the tubers are dug up be careful to ensure that tubers from different plants do not mix and leave them on the ground before collecting them. This makes it easier to inspect tubers systematically and signal, using pegs, the plants that have diseased or abnormal tubers. Count the number of healthy-looking plants to be harvested before collecting the tubers. Tubers from diseased plants must be collected last and used for consumption and not for seed.

To take yield data, collect all tubers from healthy plants and separate them into two main groups according to size: marketable tubers (≥ 30 mm in diameter) and non-marketable tubers (the rest). Then separate the tubers in the first group into two subgroups: a 30-55 mm size and the larger tubers that are normally appreciated for processing. Count and weigh the tubers to determine the total number and total weight of each of the three categories. Use this information from both plots to make a comparative analysis of tuber yields and quality.

Before leaving the field, collect all crop residues, including rotten foliage and tubers. This creates good conditions for planting the following crop.

1 Harvest manually

2 Leave the tubers on the ground

3 Signal plants with diseased tubers

4 Gather tubers in piles

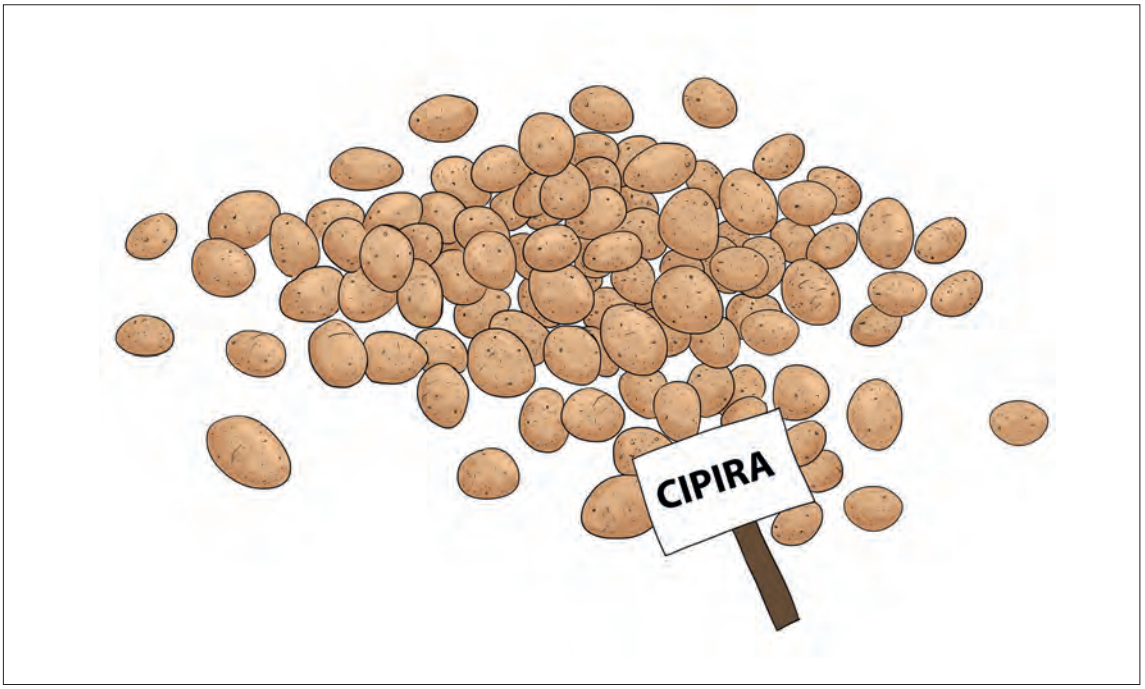


Figure 6. Harvesting and grading.

Demo 2

POSITIVE SELECTION

POSITIVE SELECTION

What

Selecting the best-looking plants in a bad-looking potato field.

Why

Appropriate technique to avoid declining yields from seed degeneration.

When

6-7 weeks after plant emergence (can be continued at harvest).

For how long

60 minutes.

With what

Many pegs (at least one per participant).

How

Positive selection, also known as “Select the best” is normally carried out throughout the season, including harvest and storage. This demo is meant only to help participants get familiarized with the best plants in the field.

Well before the demo, ask participants to look for a bad potato field in their village that is at the stage of 6-7 weeks after plant emergence. Then, use that field for the demo. During the demo, invite participants one after the other to inspect the entire field carefully to identify the best plants. This implies that you remind the participants about the main characteristics of a good plants, namely the large size according to the variety, high number of stems with good vigour, dark green leaves as well as the absence of diseases. Ask the participants to signal the best plants with use of the pegs so that they can be identified at harvest.

If possible, ask the field owner to pay special attention to these plants until harvest. This will allow the owner to harvest better quality seeds compared to what he had planted. It is also important to inform the owner to select the best tubers at harvest, which are large tubers that are more likely not to contain diseases.

1

2

Figure 7. How to select the best plants.

Demo 3

SMALL PLOT TECHNIQUE

SMALL PLOT TECHNIQUE

What

Small seed plot technique.

Why

On-farm bulking of high-quality seed sourced from trusted seed producers.

When

Throughout the season.

With what

- 200 medium sized seed tubers (less than 40 mm in diameter) of high quality,
- 27 kg of manure
- Mineral fertilisers (2.4 kg of YaraMila and 0.6 kg of YaraLiva),
- Fungicides (see training manuals),
- Insecticides (see training manuals),
- 1 measuring tape,
- 1 rope for delimitation of plots,
- 5 hoes,
- Wooden boards/pieces of timber, and
- 2 shovels.

How

The small plot of seed is a triple clean-technology (clean seeds, clean soil and clean agricultural practices) carried out on a small plot of land. Therefore, select and prepare a 12 m x 4 m area where the potato or another crop from the same family has never been grown or at least not for the last 5 years. Also, choose a site that is not downstream of other potato fields that could be a source of contamination through runoff water.

After a deep plough, delimit a small plot of land in the middle measuring 9 m x 1.5 m. Clear this plot to a depth of 15 cm by setting the soil aside. Then spread 27 kg of manure and 1.5 kg of mixed mineral fertilisers (YaraMila + YaraLiva). Refill the plot with the dug soil cleared from the plot. Then draw planting lines at a regular interval of 30 cm and make small holes about 10-15 cm deep on the lines at a regular spacing of 25 cm. Use small sticks or the end of the hoe handle to dig these holes. In principle, the entire plot will need 180 tubers, corresponding to the number of holes dug. Use the same stick, hoe handles, or hands to cover the tubers with soil.

Since it is not possible to make ridges as it is done in normal fields, hilling-up is done by hand by adding clean soil from the area around the plot. The plot should be raised above the ground surface from the time of planting. This can be aided by wooden boards or pieces of timber. As you hill up with more soil, protect the edges to maintain the top of the plot at a higher level than the ground surface (more than 15 cm).

After the plants have emerged, maintain the plot as you do in a normal field, whether it is for disease and pest control, top dressing or other good agricultural practices. It is extremely important to take precautions to prevent any entry of diseases and pests into the plot, including the use of clean agricultural tools.

1 Delimit the plot

2 Dig out the plot

3 Weigh manure and fertilisers

4 Spread the manure

5 Spread the fertilisers

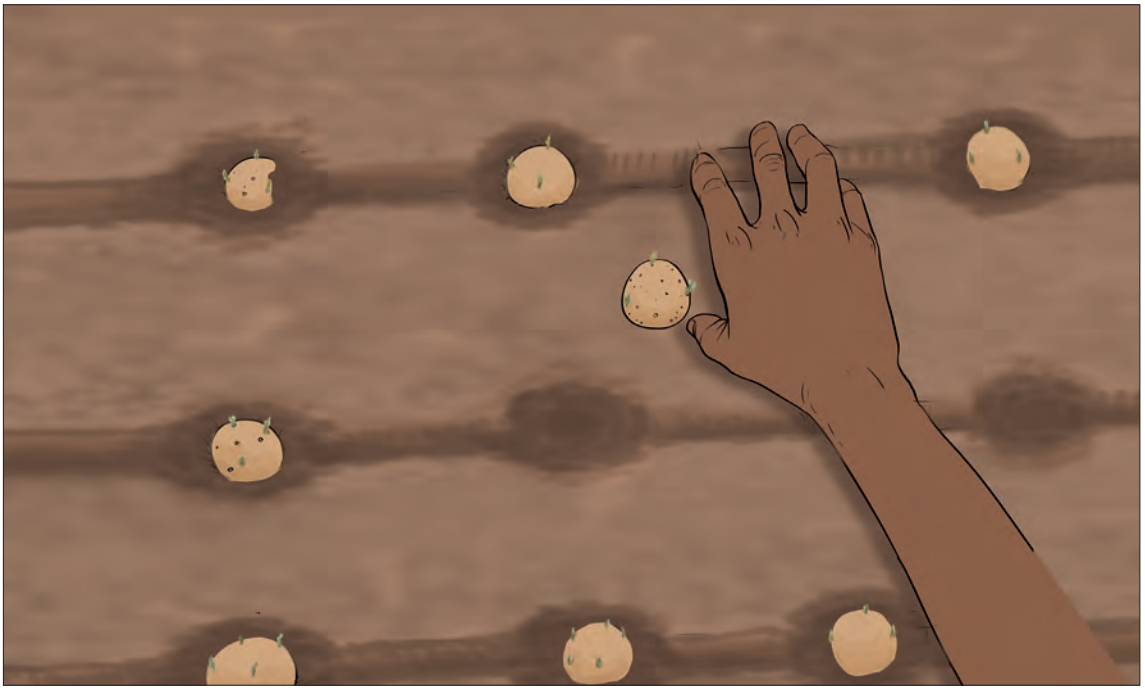
6 Refill the plot with soil

7 Mark the planting lines

8 Draw the lines

9 Make holes for planting

10 Drop seed tubers into the holes



11 Cover tubers well with soil

Figure 8. Steps for setting up a small seed plot.