

Measurement of potato tuber yield at maturity by crop cut at plot level

SOP ID: 009

Version: 1

Crop: Potato (*Solanum tuberosum*)

Relevant KPIs: Productivity — yield; Resource use efficiency — nutrient use efficiency

R&D stage (example of activities):

- Discovery stage (yield decomposition)
- Proof-of-concept stage (testing of improved agronomic practices in on-station and/or on-farm trials)
- Pilot stage (on-farm participatory trials, randomized control trial)
- Scaling stage (panel studies, ex-post impact assessment)

Module 1: Measurement of tuber yield

1.1 Required equipment/materials

- Measuring tape
- Four pegs
- String or rope
- Paper or cloth or woven bags or sacks
- Sickle
- Digging fork or hoe
- Digital weighing balance
- Data recording tools/sheet
- Drying oven
- Kitchen knife
- Cutting board.

1.2 Procedure

Step 1: Identify the right harvest

time. Harvesting should be done when the crop is well mature, at complete death of the foliage, and when the tubers' skin is firm and cannot be removed by lightly rubbing the tubers with fingers. It is recommended you dehaulm plants when the foliage begins to turn yellow, and harvest 10–15 days later. Dehaulming is removing or destroying the shoots above the soil ahead of the complete maturity of the plant. It is recommended that you apply superficial irrigation 2 to 3 days before harvesting the tubers to facilitate digging them up.

Step 2: Select the net harvest area (m²) following SOP001 Determination of the minimum number of plants and the minimum area to be harvested for correct crop yield determinations.

Step 3: Locate and mark the net harvest area by placing four pegs — one at each corner. Only tubers that are inside the delineated area should be harvested.

Step 4: Count the number of plants within the net harvest area.

Step 5: Dig up all tubers in the net harvest area and leave them on the ground to dry until the soil caked on the tubers dries and falls off (maximum 2 hours).

Step 6: Count the number of tubers. Optionally disaggregate the tubers as (i) small tubers (diameter < 3 cm); (ii) large, diseased/damaged tubers (diameter ≥ 3 cm and severe to extremely severe symptoms of diseases/pests); and (iii) large, marketable tubers (diameter ≥ 3 cm and no to mild symptoms of diseases/pests).

Step 7: Measure the fresh weight of the tubers. Optionally disaggregate the tubers as in Step 6.

Step 8: Take one or more (sub-) samples of the tubers (all tubers or disaggregated by size and disease damage as in Step 6) of about 100–200 grams per (sub-) sample for dry matter assessment and record the fresh weight. Place them in bags or sacks with proper labels (barcode, or site, date, treatment, replication, plot number, etc.). We recommend you sample at least 1% of the total tuber weight harvested in the net plot to make sure the sample is representative. If 1% of the total harvested tuber weight is more than 200 g, divide the sample into several subsamples and place them in different bags for oven-drying.

Step 9: Transport samples to a research station or any other place where samples can be properly processed, dried and stored.

Step 10: Cut the tuber samples into small pieces and oven-dry (with forced air circulation) at 105 °C for 72 hours or until constant weight. Keep some space between samples in the oven to allow a flow of air inside the oven and avoid fermentation of the samples. Measure the dry weight of the samples.

1.3 Calculation

Step 1: Calculate the fresh tuber yield (kg/ha) using formula (1).

$$\text{Fresh tuber yield (kg/ha)} = \frac{\text{Fresh tuber weight of the net harvest area (g)}}{1000} \times \frac{10,000}{\text{Net harvest area (m}^2\text{)}} \quad (1)$$

Where the division by 1000 is the conversion of grams to kg; and the multiplication by 10,000 is the conversion from m² to ha.

You *may* also calculate fresh *marketable* tuber yield (kg/ha) using the fresh weight of the marketable tubers (diameter > 3 cm and no to mild symptoms of diseases/pests) in the net harvest area.

Step 2: Calculate the dry matter content of the fresh tubers (%) using formula (2).

$$\text{Dry matter content of the fresh tubers (\%)} = \frac{\text{Dry weight of the sample (g)}}{\text{Fresh weight of the sample (g)}} \times 100 \quad (2)$$

Step 3: Calculate the dry tuber yield (kg/ha) using formula (3).

$$\text{Dry tuber yield (kg/ha)} = \left(\frac{\text{Fresh tuber weight of net harvest area (g)}}{1000} \times \left[\frac{\text{Dry matter content of fresh tubers (\%)}}{100} \right] \right) \times \frac{10,000}{\text{Net harvest area (m}^2\text{)}} \quad (3)$$

Contributors

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