

Participatory Plant Breeding

Potato Selection Manual

What is participatory plant breeding (PPB)?

PPB is a collaboration between breeding institutions and farmers that aims to develop cultivars relevant to farmer's needs. The main differences between a participatory and conventional breeding program is that in PPB most of the early selection takes place on farm.

Overview of the potato program

Initial crosses

Crosses were made at the AAFC Potato Research Centre in Fredericton by Dr. Benoit Bizimungu. Seed resulting from the initial cross was planted in the greenhouse at AAFC to produce seedling tubers for planting in the field.

Year 1 of on-farm selection

Participants received one or two populations of seeding tubers, with approximately 500 tubers per population. The first year of selection should have removed 70-90% of the clones. One tuber from each of the remaining hills (10-30% of the original population) was saved on farm for planting the following spring.

Year 2 of on-farm selection

Tubers will be cut into four pieces and planted as a tuber unit, separated by an empty space to avoid a mix-up at harvest time. Selection in year 2 will remove approximately 50% of the tuber units. The tuber units will be selected or discarded as a whole. After selection approximately 15-20 tuber units per population will remain for planting in 2015. A subset of the selected tubers will be sent to AAFC for quality analysis and yield testing.

Year 3 of on-farm selection

Tubers harvested from the selected 15-20 tuber units will be planted in larger plots to allow for yield assessment and grading. A subset of the selected tubers will be sent to AAFC for quality analysis and yield testing

Year 4

The selected clones will be assessed on certified organic farms where traits such as emergence, vigour, maturity, disease resistance, tuber morphology, defects and yields will be measured. Participants can continue evaluation on their own farms.

Implementation of the trial

Location – The tubers should be planted in an area representative of the conditions where you would normally grow potatoes. Ideally, your potato populations should be grown under normal management practices in a part of a potato field.

Planting - Selected tubers from year 1 of on-farm selection will be planted this year. Tubers will be cut into four pieces and planted as a unit. Each farmer is expected to have saved approximately 30-100 tubers for planting in the second year of selection.

- Prior to planting selections may be made based on storability (see selection section)
- Please record the number of tuber-units planted

Spacing – Approximately 1 foot should be left between the tuber pieces within the tuber unit. A space should be left between tuber units to avoid mix-ups at harvest time.

Selection

Selections will first occur prior to planting the tubers. Tubers that did not store well over winter may be discarded. The number of tubers that will be discarded prior to planting partially depends on the number of tubers that you have remaining. If you do not have many left for planting this year then be careful when making selections based on storability.

Selections will also be made once or twice during the growing season, typically after flowering and closer to maturity, and after harvest. Selections will be made based on agronomic characteristics (maturity, plant vigour, disease and insect resistance, etc.), yield potential and tuber appearance. The tuber units will be selected or discarded as a whole.

It is expected that 15 to 20 tuber units will be selected to move forward to the next generation.

All of the tubers from the selected tuber units will be harvested. A portion of the harvested tubers will be stored on-farm for planting in 2015 and a portion will be sent for additional yield and quality testing at AAFC Fredericton or the University of Manitoba.

Data Collection Sheet

Farmer/Farm Name:

Population planted:

Were selections made based on storability in the spring of 2014? Yes/No

Number of tuber-units planted:

Seeding date:

Within row spacing:

Harvest date:

Number of tuber-units selected:

Comments: