##### **PRT-CGN-PG-130 PROTOCOL mulitiplication parsnip**

This protocol applies to all parties involved in multiplication of CGN material.

### **Introduction**

Multiplications have to fulfil minimum quality requirements to ensure maintenance of genetic identity and integrity (avoiding seed mixing among accessions and minimizing loss of diversity through genetic drift) and high seed quality (absence of diseases and sufficient germination ability).

Contamination with Genetically Modified Organisms (GMO) should be prevented.

*Any deviation from this protocol should be reported to CGN, after which it will be recorded by CGN in the Multiplication logbook (FOR-CGN-PG-002).*

**Multiplication**

Maintaining genetic integrity

* Isolation
* Parsnip (*Pastinaca sativa*) is a cross-pollinating species. It is therefore multiplied by accession isolated in mesh isolation cages, isolation chambers or in isolation tunnels.
* Population size
* Multiplication is done at about 80 plants per accession; the minimum number of plants is 30.
* It is recorded how many plants per accession participated in multiplication. These data are recorded in the Multiplication logbook.
* Sowing
* Any low germination rate of the seed is taken into account.
* The number of seeds to be sown will be determined by the CGN.
* Germination recommendations and advice on sowing time and sowing method, sent along by the CGN, or own methods of the breeder are followed.
* If material germinates poorly or very slowly, these findings are recorded and copied into the Multiplication logbook.
* Sowing is done in March.
* Vernalisation
* Parsnip is biennial and needs a cold period (vernalisation) to flower in the second year of cultivation. Overwintering of the carrots takes place in the pots in a cold greenhouse.
* Cultivation
* No selection is made during plant growth. If an accession is more heterogeneous than what is expected from the passport data, or if it is a mixture of different types, the CGN is notified. The CGN determines whether and how selection may be made. This is recorded and copied into the Multiplication logbook.
* Storage during winter months
* During the winter months, the pots with the potted plants' roots stay in a cold greenhouse where the pot is kept slightly moist. The foliage may (partially) die. To prevent rot or mould growth, (part of) the foliage can be removed without damaging the roots in the pot.
* Pollination
* In the second cultivation year, pollination is done by adding flies (or other pollinating insects) in the mesh cage where the accession is potted. If necessary, flies are added at several times for sufficient pollination of the later flowering flowers. Care should be taken to ensure that the mesh cage where the plants are potted by accession is completely closed, so that no flies or other insects can enter. Plants may grow tall during flowering, which may require support material.
* Seed harvest 2nd year
* Umbels are harvested as soon as they are dried. Seeds fall to the ground quickly, so the umbels should be cut in time and then dried. The harvested seed can be bulked by accession. All seed produced will be returned to the CGN.

Maintaining identity

* Characteristics
* During sowing, cultivation, winter storage and harvesting, accessions should be clearly marked with a label indicating the field number. The field number given before sowing remains the same until seed cleaning.
* Harvest
* When harvesting, care is taken to avoid mixing with seed of other accessions.

Maintaining seed quality:

* Seed decontamination before sowing
* Not relevant.
* Pruning
* Remove foliage that dies during winter if necessary.
* Cultivation
* Not relevant.
* Inspection
* The crop is closely monitored. Diseases or pest problems are controlled and recorded and copied into the Multiplication logbook. When diseases that threaten good seed multiplication are detected, the CGN is alerted.
* Seed treatment after harvest
* The harvested plant parts are dried and the seed is kept in dry conditions at all times.
* The method of seed cleaning is being decided in consultation with CGN.

**Concluding actions**

* All deviations during cultivation are noted and sent with the seed. These notes are copied into the Multiplication logbook.
* The harvested seed is sent to the CGN as soon as possible, but no later than 6 months after harvest, with the seed bags bearing the CGN number and field number.