

From seed to seed: How to collect and multiply wild Brassica species?

Problem

The genetic diversity of cultivated Brassica crops is relatively narrow, which slows breeding gains and limits resilience. Crop wild relatives (CWR) to *Brassica oleracea* hold key adaptive traits, yet their collection and multiplication remain technically demanding and often unreliable.

Solution

To secure viability, harvest seeds in-situ at the precise stage of full maturity. Then apply a controlled, harsh vernalisation step to trigger robust, synchronized flowering.

Benefits

This protocol markedly increases multiplication success, enhances seed quality, and opens access to CWR that are usually difficult, or almost impossible, to propagate. Several CWR normally requiring two years (e.g., *B. cretica*, *B. montana*, *B. macrocarpa*) can complete multiplication in a single year under this protocol. This strengthens conservation and breeding efforts.

Applicability box

Theme: Collecting and multiplying wild Brassica species

Keywords: CWR collection, seed conservation, multiplication methods, biodiversity preservation

Context: Mediterranean area from Europe to Middle East

Application time: Collect in spring, then multiplication from fall to next summer

Required time: one-two year

Equipment: Greenhouse, climate chamber without light

Best in: Brassica crop wild relatives, Mediterranean climate



Figure 1: Brassica silique at full maturity.



Figure 2: 18-leaf stage plants with ~1/3 of the root ball removed.



Figure 3: Vernalisation of plants in closed tubs.

Practical recommendation

In the field

Field collection:

- Harvest seeds at full maturity just before natural dispersal (e.g., in South of France May–July). When possible, collect seeds from 30 individual plants to maintain initial genetic diversity.
- Target pods (siliques) that have browned and dried but not opened (Figure 1); seeds must be hard and dark. Avoid green/yellow immature seeds.
- Collect into paper bags and air-dry in shade for 1–4 weeks, then store in clean envelopes or tubes in a cool, dry place.

In the lab

Germination:

- Pre-germinate seeds in Petri dishes on filter paper (silica gel if humidity is high).
- Add a tiny drop of bleach to prevent fungal growth, moisten, and incubate at 22 °C.
- Keep paper consistently moist; older seeds may germinate slowly.

Sowing:

- In early November, sow the germinated seeds into plugs (e.g., from FERTISS) with nutrient solution under 16 h light and 21–23 °C/18–19 °C (day/night).

- In early December, transplant 4–5-leaf seedlings into 4-liter pots with pre-fertilised substrate (e.g., from Faliénor).

Harsh vernalization:

- In early February (ca. 18-leaf stage), vernalise the plants for 5–6 weeks at 4 °C without light and without substrate.
- Clean the roots manually, remove ~1/3 of the root ball (Figure 2), place plants in closed tubs with minimal humidity, adding only small amounts of water weekly (Figure 3).
- Monitor closely for wilting or rot; avoid overcrowding to maintain air circulation.
- In early March, transplant the plants into insect- and pollen-proof outdoor cages.

Flowering and protection:

- Introduce syrphid pollinators two to three times to cover the full bloom.
- Prevent aphid outbreaks with parasitoids (e.g., Aphiscout from KOPPERT); upon first signs of infestation, release gall midges (e.g., Aphidend from KOPPERT), twice at 15-day intervals (adjust to aphid species).

Harvest:

- From mid-July to September, harvest pods (siliques) into aerated net bags, dry them in ventilated tunnels, then thresh.

About this practice abstract and PRO-WILD

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PRO-WILD: The project 'Protect and Promote Crop Wild Relatives - PRO-WILD' is running from September 2024 to August 2029. The overall goal of PRO-WILD is to protect and promote crop wild relatives (CWRs) to enhance the resilience of agriculture to climate change and other environmental and anthropogenic stresses. The project focuses particularly on wild relatives of wheat, sugar beet, and brassicas. It aims to strengthen both *in-situ* and *ex-situ* conservation, identify valuable genetic traits, and facilitate the use of these resources in breeding programs for future-proof agriculture.

Project website: www.pro-wild.eu

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