

PRO-WILD
Protect & Promote Crop Wild Relatives

Practice Abstract

Seed collection protocol for wild beet (*Beta vulgaris*)

Problem

Crop wild relatives offer extensive genetic diversity with the potential to enhance the adaptability of cultivated crops to current and emerging challenges. *Beta vulgaris*, a wild relative of sugar beet, serves as a valuable source of new traits to improve modern sugar beet varieties. However, capturing the full range of its genetic diversity from wild populations remains a challenge.

Solution

A targeted field protocol to locate, identify and collect mature seeds of *Beta vulgaris* populations for genetic diversity conservation and gene bank storage.

Applicability box

Theme: Collecting wild beet seeds

Keywords: Seed collection, *ex-situ* conservation, documentation

Context: Europe and Middle East

Application time:

- Collection: spring to fall, depending on region
- Conservation: year round

Equipment: GPS device, pruning shears, paper collection bags, camera, labels, marker

Best in: Nature and gene banks

Benefits

Maximising the genetic diversity within and between wild populations of *Beta vulgaris* while ensuring optimal seed quality and availability for integration into breeding programs.



Picture 1: Basal rosette with large, wavy-edged leaves and heart-shaped bases. Photo credit: Israel Gene Bank



Picture 2: Grooved, angular stem with small greenish flowers. Photo credit: Ori Fragman-Sapir www.flora.org.il



Picture 3: Branched spikes with dark, mature fruit clusters. Photo credit: Einav Mayzlish-Gati

Protocol

1. **Preliminary survey and timing:**
   Use databases (e.g., GBIF, BIOGIS) to locate recent population records. Conduct local surveys to determine flowering and seed maturity (e.g., March-July in Israel). During surveys, mark ecologically uniform collection sites as habitats, identify suitable populations (groups of individuals in the same habitat), collect two plants in flower or fruit stage for herbarium documentation and photograph plants during flowering for documentation and taxonomic verification.
2. **Identification:**
   Confirm species using key traits – prominent basal rosette with large, wavy-edged leaves and heart-shaped bases (Picture 1); grooved, angular stems; small greenish flowers (1-2 mm; Picture 2) in dense, branched spikes; each flower with two stigma
3. **Seed collection:**
   In *Beta vulgaris*, the commonly called 'seeds' are actually woody fruit clusters (approx. 4-5 mm; Picture 3) that dry on the plant and can be collected intact. Harvest dark, mature fruit clusters (not green) from at least 50 randomly selected plants. Use pruning shears and paper bags with full collection details (accession number (if available), GPS coordinates, collection location, date, collector's name and species name.
4. **Handling and drying:**
   Dry seeds in open bags in a cool, dry, ventilated space – never in direct sun or overnight outdoors. Transfer to gene bank promptly, maintaining approximately 15% moisture.

Further recommendations

- Coordinate with relevant authorities prior to any field collection and request permits where required.
- Avoid collecting more than 20% of seeds from any wild population.
- Collect a small quantity from each individual plant rather than harvesting entire plants.
- Adjust the spacing between sampled plants to match the population size: greater distances in large populations and shorter distances in smaller populations.

Resources

- Letschert, J. P. W., and L. Frese. "Analysis of morphological variation in wild beet (*Beta vulgaris L.*) from Sicily." Genetic resources and crop evolution 40 (1993): 15-24.
- Danin, A. & O. Fragman- Sapir. 2016+ Flora of Israel and adjacent areas. https://flora.org.il/en/plants/

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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