

PRO-WILD
Protect & Promote Crop Wild Relatives

Practice Abstract

Seed Dormancy Alleviation and Germination Enhancement in Wild Relatives of Beet (*Beta vulgaris*)

Problem

Wild beet seeds are enclosed inside a dry fruit with a hard shell that prevents water and oxygen from entering the seeds, leading to physical dormancy and making germination difficult.

Solution

Two complementary methods have been developed within PRO-WILD that effectively disrupt mechanical dormancy and minimise seed damage to enhance robust seed germination.

Benefits

These two methods enable wild beet seeds to germinate directly in soil without the need to first sterilise the seeds and sow them in agar plates. This allows for a robust experimental design.

Principle

Two effective protocols for sowing *Beta vulgaris* directly in soil have been developed. Protocol 2 demonstrates a slight advantage over protocol 1.
In both protocols, the first seeds germinated within a few days, with the process continuing for around two to three weeks until all the seeds in the sample had germinated (see picture 1). Sowing the entire fruit unit can lead to more than one seedling emerging from a single unit.

Applicability box

Theme: Germination protocol

Keywords: Wild beet, mechanical dormancy, germination

Application time: Applicable under laboratory conditions year-round; suitable for outdoor sowing in conditions favorable to *Beta spp.* germination (e.g., Mediterranean winters)

Required time: 1-2 hours

Period of impact: Germination starts within days after sowing, lasting approximately 2–3 weeks

Equipment: Pots / soil mix / sandpaper (grit 120) / 98% sulfuric acid / glass containers / metal sieve / water bottle

Best in: Integrate with standard outdoor cultivation practices

Protocol 1

1. **Pre-sowing treatment**: Sand the dry fruit units with 120-grit sandpaper (see picture 2) until the outer layer is removed without damaging the seeds inside (see the video for more information).
2. **Soaking**: Immerse the sanded fruit units in lukewarm tap water (approximately 36-37°C) for one hour.
3. **Sowing**: Plant the treated units in a soil mixture.
4. **Germination conditions**: Maintain a controlled environment at 20°C with a light regime of 16 hours light and 8 hours dark.
5. **Watering**: Ensure constant moisture.

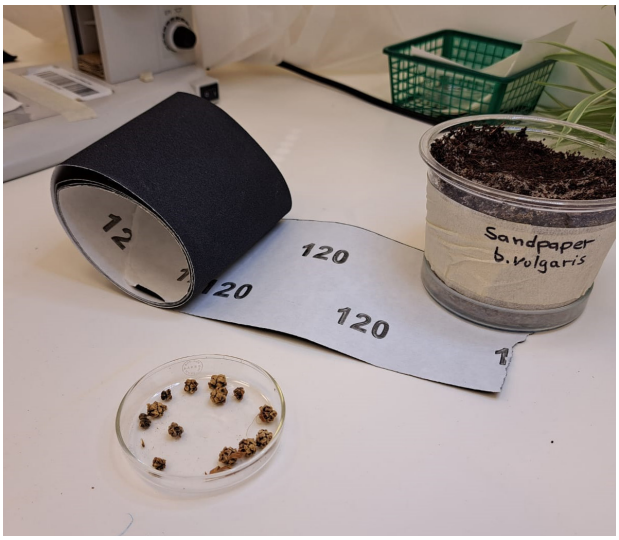
Protocol 2

Note: Always follow the relevant safety guidelines when handling sulfuric acid.

1. **Pre-sowing treatment** with sulfuric acid: Soak the dry fruit units in 98% sulfuric acid for 15 minutes.
2. **Rinsing**: Thoroughly rinse the units with tap water to remove any acid residues.
3. **Sowing**: Plant the treated units in a soil mixture.
4. **Germination conditions**: Maintain a controlled environment at 20°C with a light regime of 16 hours light and 8 hours dark.
5. **Watering**: Ensure constant moisture.



Picture 1: Seeds that have fully germinated after being sanded and soaked.



Picture 2: Sandpaper used in the protocol.

Resources

- Video tutorial: 'Seed Dormancy Alleviation and Germination Enhancement in Wild Relatives of Beet (*Beta vulgaris*)' available at https://www.youtube.com/@pro-wild

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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