

## Project 2: Germination and viability assay

For the *ex-situ* conservation, regular check of germination ability is relevant. This is not as trivial as it may seem, since many wild plants show a pronounced dormancy and do not easily germinate, although they are perfectly viable. This phenomenon is part of a so called therophytic lifestyle, whereby the seed measures lighting conditions by the phytochrome system and is, thus, able to sense, whether it is shaded by competitors. Only, when this is not the case, the seed will germinate and the plant will complete its lifecycle, before it is overgrown by competitors. Many of our “weeds” follow this strategy. Often, the ploughing of a field in spring gives the signal for germination for the weeds that can remain dormant over years in the soil, forming a so called seed bank. When humans domesticated plants, they have selected against dormancy (how? Can you give an idea?). Most crop plants are therefore not dormant any longer – but there exist still crops that germinate only in the light, which is indicative of a short domestication history (an example would be lettuce).

**Goal:** For our strawberry project (see project description 1), the accessions of strawberry should be subjected to a quality check by testing germination. To test, whether dormancy is present, in parallel, a viability test based on the tetrazolium assay will be conducted. Dormancy is characterised by a situation, where the tetrazolium values show that seeds are viable, while the germination test is negative.

**Approach:** Seeds are cultivated under three conditions:

D, 25°C

L, 25°C (adjust lighting to 15%, which corresponds to around  $50 \mu\text{M}\cdot\text{m}^{-2}\cdot\text{sec}^{-1}$  PAR (Photosynthetically Available Radiation)).

D, 25°C, 10  $\mu\text{M}$  gibberellic acid 3 (this hormone is activated during germination and is, therefore, downstream of dormancy)

Make sure that humidity is maintained (seal the boxes, where the seeds are grown, check at regular interval that the filter paper is still humid). Dried seeds usually show low germination rates...

**Evaluation:** At time of harvest (time plan) seedlings are scored in the following way:

- A. Frequency of seeds without germination
- B. Frequency of seedlings that have released a seminal root
- C. Frequency of seedlings with a shoot

This is plotted as histogram. Note: the seed material is limited, do not use more than 25% for the testing. If the material is sufficient, use 100 seeds per sample and condition. If the material is not sufficient, reduce the number of seeds accordingly. After the end of the experiment, the successfully germinated plantlets are not discarded, but transferred into a peat moss : sand : clay (2:1:1) mixture for future experiments in small seedlings cups (discuss this with the gardeners).