Evaluation of the viability of seeds preserved for 20 years

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Seed Bank
Seed bank technology
Seed collecting program

- Wild priority species:
  - Endangered
  - Endemic
  - Rare in Balearics
  - Habitat restoration
  - Crop wild relatives
The seed collection in 1990

305 ACCESSIONS COLLECTED IN 1990:
- 45 taxa
- 36 genera (23 families)

Includ 26 endemic taxa from Balearics.

<table>
<thead>
<tr>
<th>Family</th>
<th>Genus</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARACEAE</td>
<td>Arum</td>
<td>pictum sagittifolium</td>
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<td>Silene</td>
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<td>UMBELLIFERAE</td>
<td>Thapsia</td>
<td>garganica</td>
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Selection for testing viability

- At least one accession for each taxon collected in 1990 had been chosen.
- The accessions with less than 500 seeds had been discarded.
- At least one accession from each endemic taxa.
The aim of the project

1. Analyze the conservation status of the old collection with:
   a) Obtaining the germination % of each accession.
   b) Know the germination speed
   c) Viability

2. Ensuring that existing storage conditions provide effective “ex situ” conservation of Balearic species:
   a) Knowing the percentages of dormancy and the method to germinate these accessions.
   b) Verify if there are not any accessions that haven’t germination capacity.
Methodology: Germination and Viability tests

Conditions:
- Temperatures:
  - 18°C
  - 15°C
  - 10/20°C
- Photoperiode:
  - 16/8 light/dark

100 seeds
- 4 replicates
- Agar-agar at 0.6%
- Record when the radicle was at least 2mm long.

Tests with a result of 75% of germination were considered as good.
Methodology: Break the dormancy

- Mechanical scarification removing 1–2mm² of the seed coat using scalpel.
- Cool and humid stratification: 56 days at 4°C.
- Gibberelins treatment: GA₃ at 250 ppm in the growing medium.
- Seeds immersed in distilled water heated to 100°C.
Methodology: Categories of seeds

The non germinated seeds, were qualified in 5 categories after a cut-test:

- Imbibed
- Not imbibed
- Mouldy: died, seeds in poor conditions.
- Infested: fungi, insects, etc.
- Empty.
Methodology: Indexes used

- Germination %.
- Germination speed \( (T_{50}) \). Formula by Thanos & Doussi (1995).
- Seed viability %.
- Dormancy Index. Formula by Offord’s et al. (2004): \( 1-\text{(seed germ\%-viability\%)} \)
RESULTS

GERMINATION %:
- 62.5% (35) of tested accessions have had at least a 75% of germination.

PRE-SOWING TREATMENTS:
- In 32% (18) of the accessions, the highest germ. % was reached without any pre-sowing treatment.
  - In some cases, in a second test, only pre-sowing treatment has been used to have better germination speed ($T_{50}$).
- In 30% (17) of the accessions, the highest germ. % was reached by mechanical scarification using scalpel.
RESULTS

- In accessions with germination % lower than 75%, tetrazolium test and cut-test showed that viability was much higher, except for:
  - One accession of *Pastinaca lucida* with only 14% of viability.
  - One accession of *Phlomis italica* with only 11% of viability.
RESULTS: germination % by families
RESULTS: germination speed % by families
RESULTS: viability % by families
RESULTS: remaining dormancy after pre-sowing treatments
The quality of the seed collection estimated by its viability is so good in all the tested accessions.

The accessions with low germination % and high viability %, exhibited some degree of dormancy after pre-sowing treatments.

Need further research in order to better understand the dormancy and germination protocols after conservation process, mainly in the families:
  - Aristolochiaceae
  - Cneoraceae
  - Ephedraceae
  - Rhamnaceae
  - Thymelaeaceae
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