

Technical information sheet_2

The most difficult moment for a seed collector is often deciding whether a population meets the minimum quality and quantity standards for seed-sampling for a particular purpose or project. This information sheet provides guidelines and a tool – the pre-collection checklist - to help collectors carry out that assessment and ensure that seed collections arriving at the seed bank are of the highest possible quality and quantity for long-term conservation.

Prospecting

If possible, make a preliminary trip to locate populations of the target species, confirm the identification, and estimate fruiting period. If this is not possible, try to consult a local naturalist or other expert who can inform you of locations. Make use of information on herbarium sheets and in published floras and monographs.

Identification of the target species

It is critical to the value of the seed collections that the species is accurately identified. Seed collectors must be able to distinguish the target species from others in the same genus. What other similar species are present? Can you distinguish the target?

- Allow time prior to the trip to become familiar with the identification features of the species. Consult field guides or herbarium staff on key characters before the trip.
- Visit the potential collecting locations early in the season (ideally at flowering) to make herbarium specimens and to confirm identification with local specialists.
- Invite an appropriate taxonomist or specialist in the local flora to join the team if possible.
- Bring and use relevant identification guides, floras, or field guides where available.

Color photocopies of herbarium sheets of target taxa may be a useful reference.

Assessing the population

A seed collection will be most representative of the population if many individual plants, (ideally at least 50), are sampled randomly and evenly across the extent of the population.

- What is the extent of the population?
- How many individual plants are there?
- Is the population damaged in any way?
- Is the population at reproductive stage?
- Do sub-populations exist?

Assessing readiness for collecting

Seeds must be collected at the optimum stage of development to maximize longevity in long term storage (fig 1). Seeds in the process of natural dispersal are suitable for collection. Seeds collected before or after this stage may not survive as long in storage. Look for

- Changes in fruit colour
- Changes in seed coat colour
- Fruits splitting or breaking open
- Seeds rattling
- Seeds that are hard and dry
- Some seeds already dispersed

What is a population?

A useful working definition for out breeding species (most wild plants are out breeders) is:

a group of individuals, capable of interbreeding, that occupy a defined geographic area.

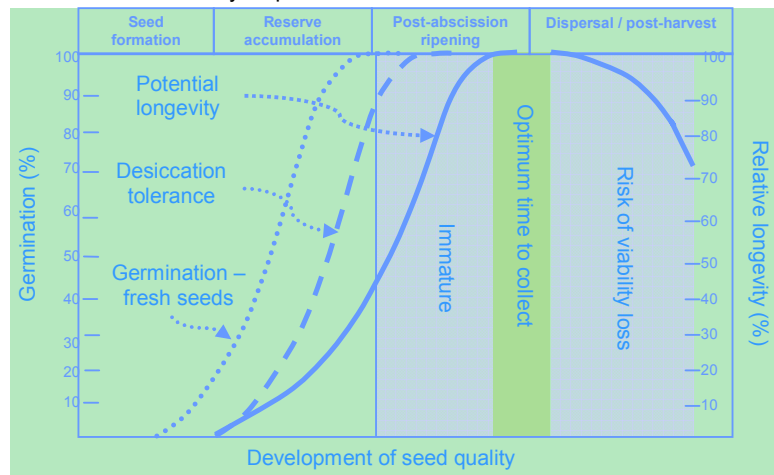
Consider any obvious geographic barriers to gene flow (eg wide rivers). What are the pollination and seed dispersal mechanisms? (some insect pollinators may have a home range of 5km).

Detailed analysis of the partitioning of genetic diversity within the species would be necessary to confirm the actual extent of the population.

Assessing the physical quality of seeds

Some plant families may have critically high levels of non viable seeds. Poaceae, Asteraceae, Cyperaceae and Combretaceae typically show high levels of 'empty' seeds. Leguminosae collections are often affected by insect damage. It is better to avoid collecting such seeds.

The 'cut test' (see box) is the only simple and reliable technique for providing accurate, quantitative seed-quality data in the field. Seek



Timing of seed collections: challenges for collectors

- Individual plants may initiate flower and fruit development on different dates and ripen over an extended period
- In species with indeterminate inflorescences, several stages of development may be evident on a single individual.
- Seed may be shed over a long time-period and may be easily lost from dehiscent seed heads.

another population if the proportion of empty and infested seeds is greater than 30%; otherwise, increase the number of seeds collected in order to compensate for the non viable ones.

Assessing seed availability

An ideal seed collection for long-term conservation will contain at least 10,000 potentially viable seeds (see box). First, estimate the number of plants at the stage of seed dispersal. Taking a representative sample, estimate the number of available seeds per fruit and fruits per plant. Is it possible to collect sufficient healthy seeds (sampled from at least 50 individual plants)



'Cut test' to assess seed quality

Cut 10-20 seeds, (if possible along both axes) collected from several well-spaced individuals in the population, using secateurs, scissors, nail clippers or similar sharp blades and record the number of empty, aborted and infested seeds. Tiny seeds can be held on adhesive tape during sectioning. A x10 or x20 hand lens will help. With care, seeds that are known to be non-toxic can be crushed between fingernails or teeth if sectioning is difficult.

without taking more than 20% of the mature seeds available on the day? If seed availability is less than 2,000 seeds, consider carefully whether other more productive populations could be collected instead. In the case of rare and threatened species, aim to collect a minimum of 500 seeds, always taking into account the 20% rule (see below). Multi-year collecting and/or propagation may be necessary to achieve a good-sized seed collection for such species.

Setting a safe limit to seed collecting

Do not collect more than 20% of the mature seeds available on the day, unless you have evidence that this level of harvest will not cause harm. This will ensure that enough seeds are available for natural regeneration and long-term survival of the population. Take care to avoid harming any other flora or fauna at the collecting site.

To collect or not to collect?

If the population does not meet minimum project criteria for seed-sampling:

- Seek another population of the same species on the same trip.
- Return to this population on a later date.
- Take herbarium specimens and detailed notes to confirm the identification.
- Assess the next target species available.

A seed collecting programme should include primary and secondary target taxa. If the primary target taxa cannot be collected, make collections from secondary targets. Using this systematic but flexible approach, the team remains productive in all situations and will become well-prepared for future collection trips.

Further reading

Seed collecting techniques - technical information sheet_3 in this series

Guerrant, E., Havens, K; Maunder, M. (2004): *Ex situ Plant Conservation, Supporting species survival in the wild*. CPC. Island Press.

Guarino, L; Ramanatha Rao, V; Reid, R; (eds) 1995 *Collecting Plant Genetic Diversity- technical guidelines*. CABI

Why make such large collections?

A collection of at least 10,000 seeds will enable fullest possible use to be made of the seed. Seeds are ideally needed for the following purposes:

- Base collection (ideally 500 seeds) kept in case of loss of wild population
- Developing an effective germination protocol (100 seeds)
- Viability monitoring over the anticipated 200 yr lifespan of the collection (650 seeds)
- Duplication at another bank for safety (at least 1150 seeds)
- Distribution to users (as an indicative figure, 5000 seeds)

Falk, D.A; & Holsinger, K.E; (1991) *Genetics and Conservation of Rare Plants*. Oxford University Press.

Hay, F.R. and Smith, R.D. (2003). Seed maturity: when to collect seeds from wild plants, pp. 97-133. In: R.D Smith, J.D Dickie, S.H. Linington, H.W Pritchard & R.J Probert (eds) *Seed conservation: turning science into practise*. Royal Botanic Gardens, Kew, UK.

Example of a pre-Collection checklist
(Developed for a conservation and restoration project)

Identification

Family Locality
 Genus Date of assessment
 Species

Population assessment

Taxon identified and apparently similar taxa distinguished: Yes/No
 Approx. area of population: x (m², km²)
 Approx. number of accessible individual plants: 1-10 11-50 51-100 101-1000 >1000
 Is there any evidence that seeds have been disturbed/damaged by herbicides, fire etc. Yes/No

Assessing readiness of population for seed collection

Give percentage or tick the most frequently occurring phenological stage:

Vegetative
 Reproductive:
 Flowering
 Immature seeds
 Around natural dispersal
 Post dispersal

Estimated number of individual plants around natural dispersal:

Physical quality (cut-test of 10 seeds)

Of the sample examined, give percentage or tick the most frequently occurring:

Full seeds
Empty seeds
Infested seeds

Availability of seeds

Average number of seeds per fruit/dispersal unit
 Average number of fruits/dispersal units per individual plant
 Is it possible to collect 5,000 - 10,000 healthy seeds around natural dispersal without taking more than 20% of the available seeds? Yes/No

Monitoring

For populations NOT yet at natural dispersal estimate probable date to return and collect seeds: