



# Making the most of small amounts of seed

*Suggested procedures to handle small samples of tropical forage seed that needs to be increased for meaningful testing of germplasm*

Alliance

---



**Tropical Forages and Genetic Resources Program**

# Making the most of small amounts of seed

If you request seed of accessions of forage species from a genebank or a genetic resources program, you will probably receive only very small quantities, which in most cases are insufficient for direct sowing in the field. **Consequently, that seed must be multiplied to quantities that will allow germplasm testing under field conditions.** These quantities will depend on your plans to evaluate/test the new material (e.g. in 2 m × 3 m plots with rows 50 cm apart). Since soil at testing sites is commonly quite variable, it is strongly suggested to use at least three replications.

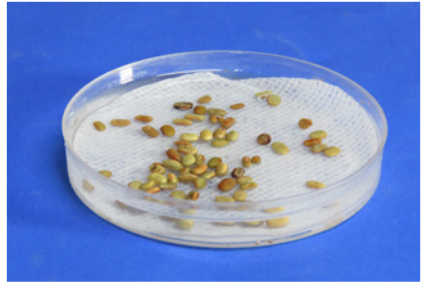
**It is advisable not to use all seeds of the sample received but to maintain a small reserve for eventualities.** The seed quality of legumes and grasses that you receive, will have been tested for viability (= potential germinability) by the institution furnishing the samples. Most grass seeds germinate readily unless seeds are very fresh and exhibit some degree of physiological dormancy. However, most legume seeds do not germinate readily because they are protected by a hard seed coat that does not allow water penetration (imbibition). To break this physical dormancy (“hardseededness”), the seeds must be scarified, i.e. the seed coat (testa) must be injured.

**Legume seeds:** Scarification can be done by various means (soaking in hot water, heat treatment, acid treatment, use of abrasive paper) but the seeds of different species might respond differently. The best method is scarification by nicking the testa (= cutting off a very small piece of the seed coat), e.g. with a sharp blade cutter (Photos 1 and 2).



**Photo 1:** Scarifying small legume seed with blade cutter. **Photo 2:** Scarifying large legume seed.

The next step is to transfer the scarified seeds to e.g. a Petri dish with filter paper, covered with about 1 mm of water (Photo 3). To protect against environmental fungi it is advisable to add some commercial hypochlorite (household bleach solution) to the water (5 mL/L).



**Photo 3:** Scarified legume seeds in Petri dish with water.

The seeds will now swell and release chemical compounds including pigments, and after a couple of days should be washed with clean water (Photos 4 and 5) and transferred to a new Petri dish with wetted filter paper (i.e. no standing water).



**Photo 4:** Imbibed legume seeds requiring washing.



**Photo 5:** Washing seeds after a few days.

After another few days the radicle (embryonic root) will emerge and the germinated seeds are ready for transferring to a tray or plastic bag with a soil-sand mixture (Photo 6).



**Photo 6:** Germinated legume seeds in Petri dish.



**Photo 7:** Preparing (watering) a fine soil/sand mixture.

The tray or plastic bag should contain a fine, freely draining soil-sand mixture that, prior to transferring the germinated seeds, should be well watered, including 5 mL/L of commercial hypochlorite for fungus control (Photos 7 to 9). Scarification is not necessary for seeds (= pods) of *Arachis* spp.), which can be sown directly into the potting medium.



**Photo 8:** Transferring germinated legume seeds.



**Photo 9:** Germinated legume seeds transferred to plastic bag.

**Grass seeds:** Grass seeds (= spikelets) generally do not require scarification and are best sown directly into a tray with fine sand (Photo 10). There may be cases in which grass seed is too fresh and does not germinate readily because of physiological dormancy; then watering with a solution of 0.5% potassium nitrate ( $\text{KNO}_3$ ) might help.



**Photo 10:** Sowing of grass seeds in tray with fine sand.

After some days seeds will germinate and seedlings emerge (Photo 11). Once they are big enough, they should best be transplanted to plastic bags (Photo 12).



**Photo 11:** Grass plantlets emerging in tray.



**Photo 12:** Transferring grass plantlets to plastic bag.

**Grasses and legumes:** Growing plantlets should be maintained for several weeks under controlled conditions.

Pest control may be necessary, being sure that any chemicals used will not adversely affect young plants. It is important to avoid excessive watering that leads to “damping off”. Once plants are well established, they can be transplanted to the field (Photos 13 and 14).



**Photo 13:** Young legume plants ready for transplanting to the field.



**Photo 14:** Transplanting young legume plants to the field.

If it was not possible to obtain enough legume plants, seed increase should first be done from a number of plants maintained in a pot or plastic bag under controlled conditions (Photo 15).



**Photo 15:** Adult flowering and seed setting legume plant in a pot.

Ripe pods can then be hand-harvested and dehulled. For some species, entire seedheads will be harvested (e.g. *Stylosanthes* spp.; Photo 16), dried and threshed using a rubber (or vinyl pyramid matting) board (Photo 17). This method can also be applied to separate (dehull) seeds from the pod integument of a number of species of other legume genera such as *Aeschynomene* and *Desmodium* (Photo 18).

Some stoloniferous legumes such as *Desmodium heterophyllum* or *Arachis pintoii* can also be propagated vegetatively from stolons in the pot (Photo 19).



**Photo 16:** Hand-harvested seedheads of a *Stylosanthes* species.



**Photo 17:** Threshing of dried *Stylosanthes* seed heads with rubber board.



**Photo 18:** Dehulling of *Desmodium* pods with rubber board.



**Photo 19:** Taking rooted stolons from a potted *Desmodium heterophyllum* plant.

Vegetative propagation from potted plants is also indicated for most grasses if too few plants were produced from the seed sample received.

For this, adult potted plants (Photo 20) can be easily split into a number of pieces (Photo 21) for direct transplanting to the field (if conditions are optimal) or after an additional phase of maintaining plants under controlled conditions (e.g. in a greenhouse) in plastic bags.



**Photo 20:** Adult grass plants ready for splitting into rooted portions.



**Photo 21:** Vegetative propagation: Splitting of a grass tussock.

Alternatively – or in addition to vegetative propagation – ripe seeds can also be harvested in the greenhouse by e.g. regularly shaking spike-bearing culms of a living plant over a plastic tray or bucket into which all ripe spikelets (seeds) would fall (Photo 22).

Seed harvesting in the field is done by hand. In the case of legumes and depending on the species, e.g. by regularly harvesting of all ripe pods and removing the seeds from the pods (climbing legumes will require a trellis system, also at the greenhouse level; Photo 23),



**Photo 22:** Harvesting of grass seeds.



**Photo 23:** Pod harvesting of a climbing legume in a trellis system.

or, as in the case of *Stylosanthes* spp., by cutting the plant tops (Photo 24), then drying and threshing them (Photo 25).

Grass seed (spikelets) from small plots or rows can be harvested as described above (Photo 22).



**Photo 23:** Seed harvesting of a *Stylosanthes* species in the field.



**Photo 24:** Threshing of dried *Stylosanthes* material.

Further processing (cleaning) of harvested seed material will depend on the species and the amount harvested (e.g. Photo 25).

In many cases, using a seed separating device such as a blower (air-screen cleaner) will be convenient.



**Photo 25:** Processing of harvested seed material.

Relevant seed cleaning information can be found in the following literature:

HSU (Herbage Seed Unit). 1994. Forage seed production. ILCA Training Manual. ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia. 70 pp. ISBN 92 9053 293 9 <https://hdl.handle.net/10568/4479>

Loch DS and Ferguson JE (eds.) 1999. Forage seed production, Volume 2: Tropical and subtropical species. CAB International, Wallingford, UK. 479 p. ISBN: 0 85199 191 2

Partridge IJ (ed.) 1996. Tropical pasture seed production – a training manual. Department of Primary Industries Queensland, Brisbane, Australia. 110 p. ISBN 0 7242 6650 X

These guidelines were developed as part of *Tropical Forages: an Interactive Selection Tool v2*, a collaborative effort between the *Alliance of Bioversity International* and the *International Center for Tropical Agriculture (CIAT)* and the *International Livestock Research Institute (ILRI)*, based on the first version published in 2005 by CSIRO Sustainable Ecosystems, Department of Primary Industries & Fisheries (Qld), CIAT & ILRI. [www.tropicalforages.info](http://www.tropicalforages.info)



This document is licensed for use under the Creative Commons Attribution 4.0 International license (CC BY 4.0). Photographs by A Ciprián and JJ González (Alliance Bioversity-CIAT). Design: JL Urrea (Alliance Bioversity- CIAT), Rev. 2020-02.