No. 5.4 Agricultural Programmes: Testing Seed Germination Capacity

Why does seed germination capacity need to be tested?

Germination[1] rate is a key component of seed quality. It will influence the number of plants growing in a surface and the final yield.

Where the quality of available seeds is uncertain (e.g., when seeds are uncertified or old), the most reliable way to assess quality is to actually germinate a sample of them. *A germination test will determine what proportion of seeds will germinate under favourable conditions and produce normal seedlings.*

Testing the germination of local seeds is a relatively simple process; it does not require complex or expensive laboratory analysis. Basic requirements are water, oxygen, light and suitable temperature.

Determining the quality of seeds is vital to the viability of any of Oxfam GB's emergency food security and livelihoods responses involving seeds (e.g., seed and tool distributions, seed fairs and cereal banks).

A rapid method is presented below and it can be applied to any programme involving the purchase of local seeds.

Fig. 1: Anamargo seeds, often grown with corn in Mexico (Credit: Diana Hernandez Cordero/Oxfam)

Is there a simple way to test seed germination capacity?

The following is a simple way to test germination capacity in the field.

Step 1: Identification of suppliers and seed samples

- Identify and contact local seed suppliers
- Ask for a representative sample of the seed (preferably, make a visual check to be sure it is truly representative), approximately 0.5 kg for each species and variety requested
- Label the sample with the name of the supplier, the species and variety of seed, year of production and any useful technical information

Step 2: Launching the test

- For each sample, take a *minimum* of 100 seeds (500 seeds will be more accurate)
- Prepare a substratum. There are a number of options, including:
  1. Plastic boxes or plates with a layer of absorbent cotton, and wet it (the quickest option)
  2. Wet pots of land (germination will be slightly slower, but more representative of the normal growing conditions)
- Add the seeds to the substratum, being careful to keep them properly labelled
- Put the test boxes and pots in the optimal germination conditions (humidity and temperature) for each species and variety being tested. (Seeds of different species have different requirements and there is no general set of conditions – see, for example, Bioversity International 2006, for guidelines for testing germination in common crop species)

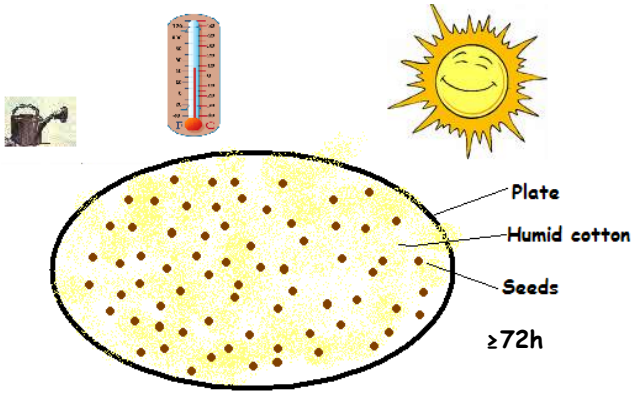

Fig. 2: The necessary components of a germination test: oxygen, light, water, suitable temperature and time.

Step 3: Reading the results

- After 72 to 120 hours (or more, according to the species being tested—seeds that take a long time to germinate, may be soaked in water for a few hours prior to testing to reduce germination time), count the number of seeds that have germinated

- Transform the result into a germination rate (e.g., if 180 seeds have germinated out of 200 sown, this makes a (180/200)*100 = 90 percent germination rate; if 475 seeds have germinated out of 500 sown, the germination rate is 95 percent)

Seeds are usually considered of unsuitable quality when the germination rate is below 90 percent.

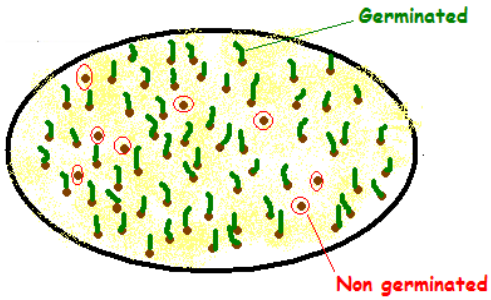

Fig. 3: In this example, after 72 hours, 8 seeds out of 100 sown have not germinated. Then, the germination rate after 72 hours for this sample is: (100-8)/100)*100 = 92 %

Are there other ways to assess seed quality?

There are a number or other ways that seeds can be assessed for quality, including:

- **Physical purity**: % of the sample represented by seeds. The lower the physical purity, the higher the amount of debris and other non-seeds elements (and thus the lower is the overall seed quality);
- **Species purity**: % of the sample that is constituted by seeds of the expected species. After harvest or during storage, other species, especially weed seeds, may mix with the sample. Detection of weeds in a seed sample is very important as weeds will negatively affect yields and increase farmers' workload;
- **Varietal purity**: % of the expected variety of a seed in a given sample. Grain size and shape (length to width) is a stable seed property that can be used to measure purity. Comparing the length-width ratio of a sample with an expected (published) value can indicate purity, with high deviation from the expected value indicating high impurity (i.e., sample is either a different variety or mixture of varieties); and,
- **Sanitary quality**: detection of pathogens in the seed sample. This is detected in a laboratory. If there is a suspicion of poor sanitary quality of seeds, it is worth sending the seed sample to a laboratory, as seeds affected by pathogens will give low or no yields and might contaminate an otherwise safe growing area.

Where can I find further reading and more detailed information?

Oxfam EFSL Rough Guides on Livestock Programmes – *4.1 Agricultural Support Programmes* – *4.2 Seed and tool distributions* – *4.3 Seed fairs*	Further details of germination testing, including guidelines for the most common crop species: Bioversity International 2006. *Manual of Seed Handling in Genebanks* (accessible on FAO website – www.fao.org)

Who can I contact for more information and guidance?

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Notes:

1. Germination in plants is the process by which a dormant seed begins to sprout and grow into a seedling under the right growing conditions. SOURCE: www.biology-online.org (Accessed 1 March 2010).
2. For test procedures for varietal purity, see: http://zj.shuidao.cn/IRRI/seedMgmt/Varietal_purity.htm (International Rice Research Institute 2003).