

Establishing Germination Testing as a Priority in a Genebank



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Abstract

In 2002, the Plant Genetic Resources Conservation Unit (PGRCU), Griffin, GA, established a program to test the germination of plant genetic resources maintained in the on-site collection. Prior to this date, regeneration priorities were based on seed age and quantity of seed available for distribution, with little local evaluation of seed quality. The objective of this paper is to present the development of a germination testing program for a diverse plant genetic resources collection of over 86,500 accessions and 1,500 species, establishment of germination testing methods, and determination of priorities and procedures to effectively characterize seed quality of this collection.

Germination Procedures Used

Most accessions tested at Griffin are from wild species for which there are no standardized germination testing procedures. The germination procedures utilized for crop and related wild species are taken from the following sources:

1. A total of 99 germination procedures for crop accessions were used directly from AOSA Rules for Testing Seeds.
2. A total of 133 germination procedures for crop accessions were used directly from IBPGR Handbook of Seed Technology for Genebanks (Ellis et al., 1985).
3. A total of 68 germination procedures for crop and/or wild accessions were adopted from communications with germination staff at National Center for Genetic Resources Preservation (NCGRP), Ft. Collins, CO.
4. A total of 962 germination procedures for wild accessions were adopted from previous references listed above along with curator input, other expert input, and additional references including research papers and state seed laboratory communications.

Table 2. Progress on germination testing of genebank collections

Crop	Total No. Accessions	Germination Tests	
		No.	Percentage
Annual clover	2,139	1,836	85.8
Castor bean	374	353	94.4
Cowpea	8,041	2,230	27.7
Cucurbits	1,396	653	46.8
Eggplant	1,018	937	92.0
Gourds	488	260	53.3
Warm-season grass	6,761	1,477	21.8
Guar	411	406	98.8
Kenaf & Roselle	340	307	90.3
Luffa	164	132	80.5
Misc. legumes	3,074	2,343	76.2
Mung bean	4,203	3,899	92.8
Okra	2,970	1,755	59.1
Peanuts (cultivated)	9,174	3,259	35.5
Peppers	4,699	4,640	98.7
Pearl millet	1,319	1,069	81.0
Sesame	1,216	1,211	99.6
Sorghum	35,208	26,053	74.0
Watermelon	1,898	1,742	91.8
Other spp.	1,785	866	48.5
Total	86,678	55,428	63.9

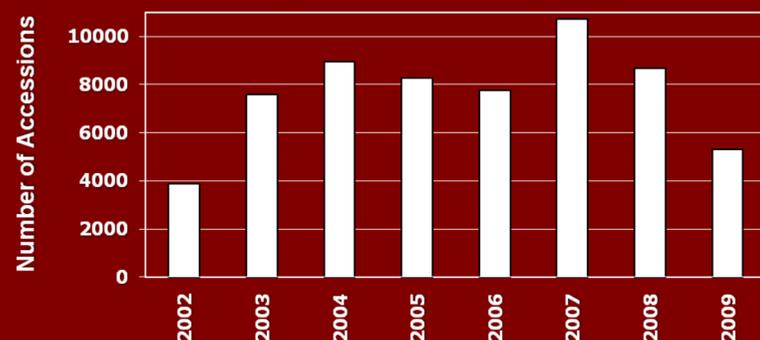
Steps to Establish Germination Testing Program

1. Determine the procedures to use to test germination of over 1,500 wild and crop species.
2. Determine the number of seeds to test for accession inventories containing few to thousands of seeds.
3. Develop priorities to test germination of genebank collection of >86,500 accessions over time.
4. Devote personnel, equipment, and supplies to the germination testing program.

Table 1. Number of seeds used for germination test

No. of Seeds in Accession	No. of Seeds Tested for Germination
>1,000	100
500-999	50
425-499	25
210-424	10
<210	regenerated prior to germination testing

Figure 1. Number of accessions tested for germination per year



Priorities for Germination Testing

1. Recently-regenerated seeds of accessions
 2. Crop accessions with no previous germination test
 3. Wild relative accessions with no previous germination test
 4. Accessions tested over 5 or more years ago (retesting interval dependent on the species)
 5. Inventories with no previous germination test
- In some cases, accessions were selected for germination testing when the seed sample was being handled for other reasons such as distribution, characterization, or back up sample.

References

- Association of Official Seed Analysts. 2009. Rules for Testing Seeds. AOSA, Ithaca, NY
- Ellis, R.H., T.D. Hong, & E.H. Roberts. 1985. Handbook of Seed Technology for Genebanks. Vol I: Principles and Methodology. IBPGR, Rome, Italy.
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