



**HOME SEED STORAGE  
FOR HAWAI`I`S GARDENERS**

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# **HOME SEED STORAGE FOR HAWAII'S GARDENERS**

**SLIDE SHOW: Scientific Principles of Seed Storage**

**LECTURE: Practical home seed storage  
Techniques  
Equipment**

**DEMONSTRATION: How you can store seeds at home**

**TIME FOR QUESTIONS: At the end of the Demonstration**

**MORE QUESTIONS? I'll be here tomorrow**

## **ORTHODOX SEEDS** **(tolerate extreme drying)**

- Tolerate drying to low moisture levels (2-5% of wet weight)
- Longevity increases as moisture level decreases
- Tolerate low temperatures, can be frozen
- Longevity increases as temperature decreases
- Often long-lived

## **RECALCITRANT SEEDS** **(do not tolerate drying)**

- Intolerant of drying
- Seeds die if moisture level is reduced to less than 12-31% of wet weight
- Intolerant of low temperatures
- Lose viability rapidly after ripening

## **INTERMEDIATE SEEDS** **(tolerate some drying)**

- Tolerate drying, but only down to a critical moisture level
- Tolerate some low temperatures, but not freezing
- Short to medium term storage is practical

## DISTRIBUTION OF SEED STORAGE BEHAVIOR

	<b>Worldwide</b>	<b>Tropics only</b>
<b>ORTHODOX</b>	<b>9406 (93.2%)</b>	<b>278 (70.2%)</b>
<b>INTERMEDIATE</b>	<b>145 (1.4%)</b>	<b>9 (2.3%)</b>
<b>RECALCITRANT</b>	<b>543 (5.4%)</b>	<b>109 (27.5%)</b>
<b>UNCERTAIN</b>	<b>531</b>	
<b>Total</b>	<b>10,645 species</b>	<b>396 species</b>

### Sources:

**Worldwide:** Flynn, S., Turner, R.M., and Stuppy, W.H. 2006. Seed Information Database (release 7.0, October 2006)  
<http://www.kew.org/data/sid>.

**Tropics only:** Tweddle, J. C., J. B. Dickie, C. C. Baskin, and J. M. Baskin. 2003. Ecological aspects of seed desiccation sensitivity. *J. Ecol.* 91: 294-304.

Table 1. Factors by which longevity is altered by a difference of 1% moisture content in barley (*Hordeum distichum* L.) and onion (*Allium cepa* L.) seeds.

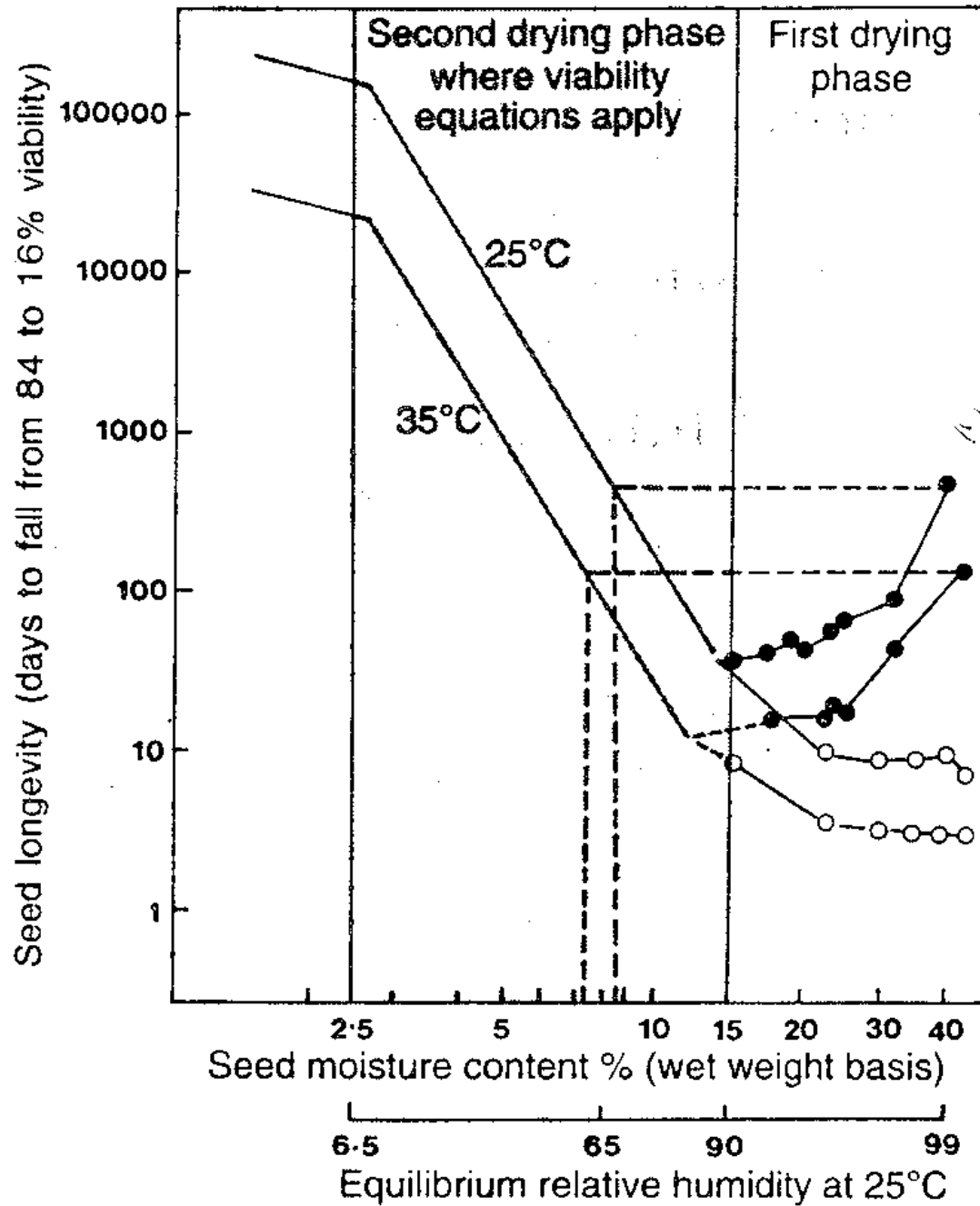
Moisture content range in % fr.wt.	<u>Factor by which longevity is altered*</u>	
	Barley	Onion
4-5	3.70	2.17
5-6	2.92	1.88
6-7	2.47	1.71
7-8	2.19	1.59
8-9	2.00	1.50
9-10	1.86	1.44
10-11	1.75	1.39
11-12	1.67	1.35
12-13	1.60	1.32
13-14	1.56	1.29

\* For a decrease in moisture content over the ranges indicated, longevity is increased by the factor indicated; for an increase in moisture content over the ranges indicated, longevity is decreased by the reciprocal of the factor indicated. E.g. when drying a seed lot of non oily seed in store from 10 to 6 %, moisture content will approximately increase the longevity by  $1.86 \times 2.00 \times 2.19 \times 2.47 = 20$  times. E.g. if it took the seed lot at 10% moisture content 2 years before the germination percentage fell to 70%, it would stay approx. 40 years in the same store before the germination percentage fell to 70% if the seed lot had been dried to 6% moisture content.

Table 2. Factors by which longevity is altered by a difference of 5°C mean storage temperature in barley and onion seeds.

Temperature range	Factor by which longevity is altered in barley and onion*
0-5	1.48
5-10	1.71
10-15	1.79
15-20	1.88
20-25	1.97
25-30	2.08
30-35	2.18
35-40	2.29
40-45	2.41
45-50	2.53

\* For a decrease in temperature over the ranges indicated, longevity is increased by the factor indicated; for an increase in temperature over the ranges indicated, longevity is decreased by the reciprocal of the factor indicated. E.g. lowering the temperature 5°C with an air conditioner will approximately double the longevity. Storing in a cold store instead of under ambient conditions (lowering the temperature from 25°C to 5°C) will multiply the mean viability period by  $1.97 \times 1.88 \times 1.79 \times 1.71 = 11$ .



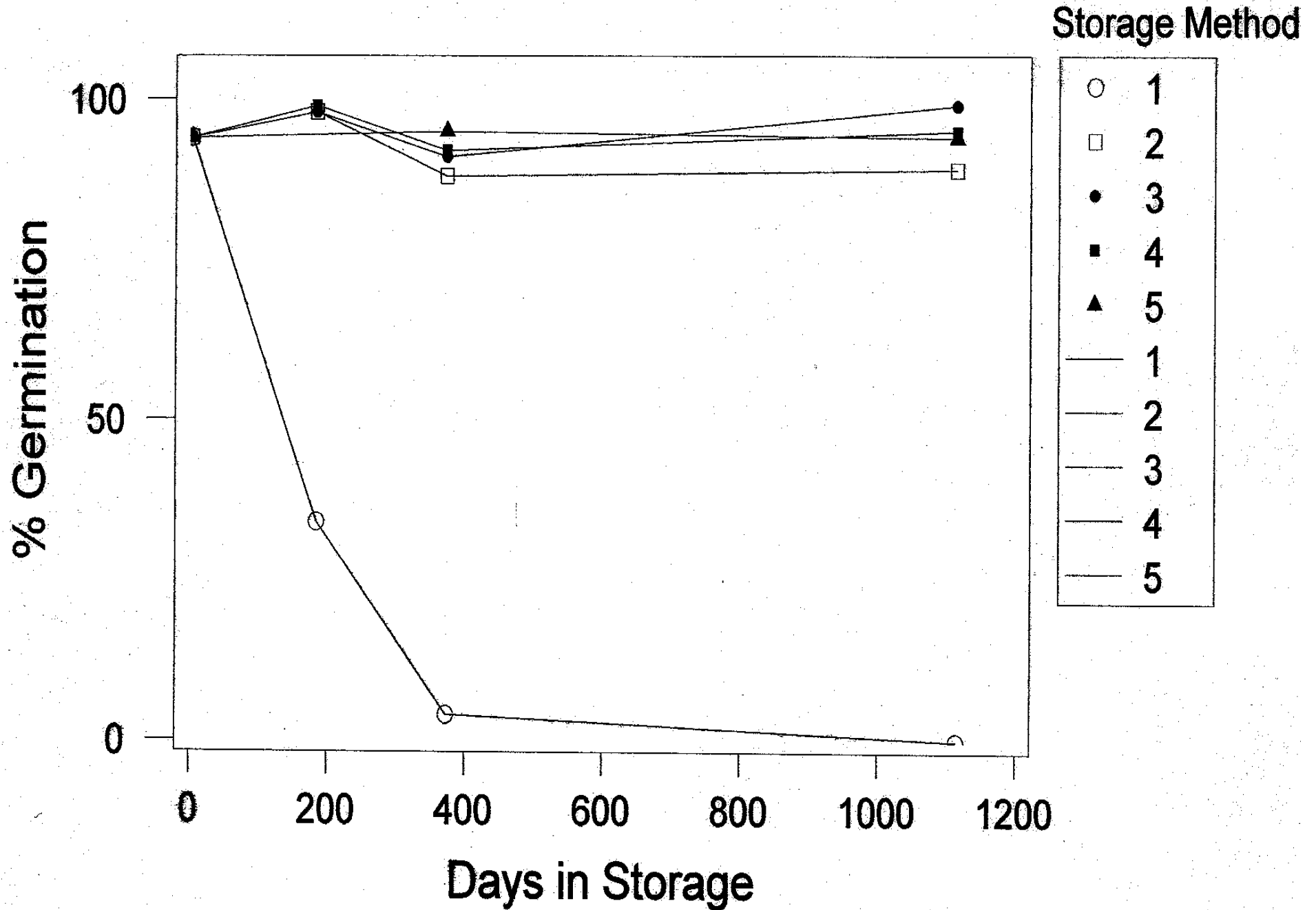


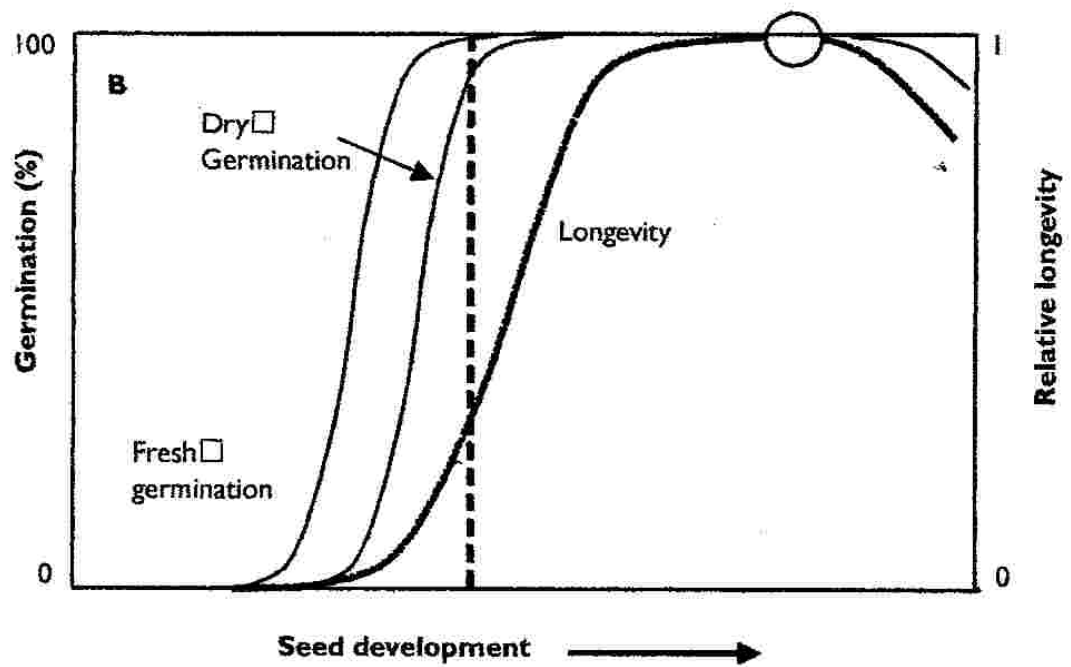
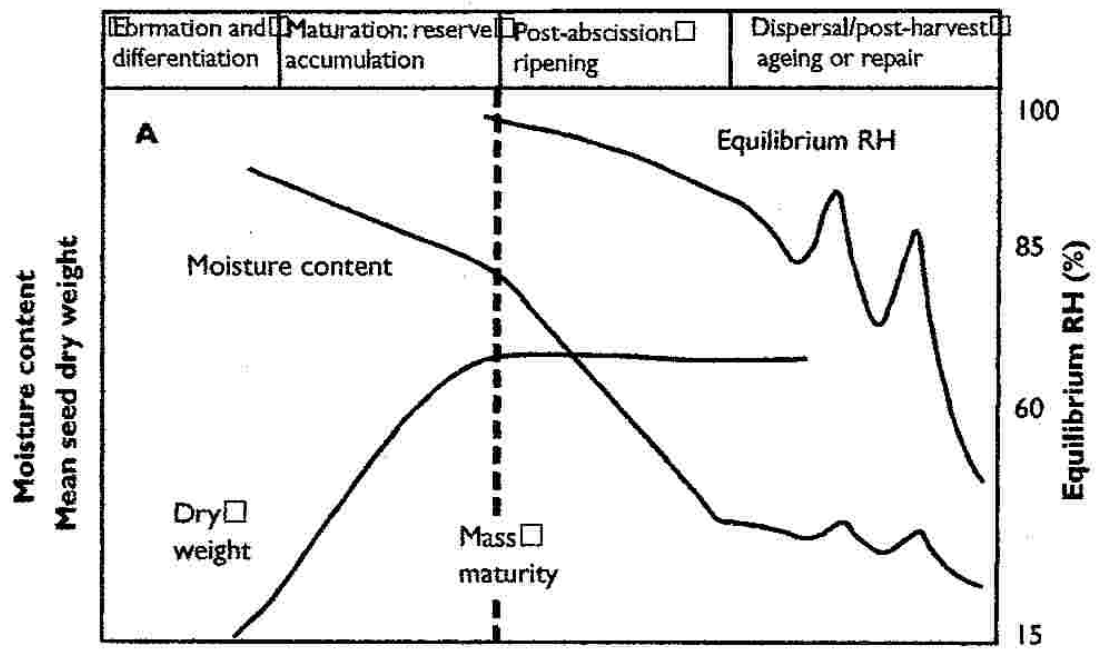
## **PREDICTED SEED LONGEVITY IN STORAGE**

### **TEMPERATURE (Deg. Celsius)**

<b>SEED MOISTURE LEVEL BY WEIGHT (wet basis)</b>	<b>25 ° (ambient)</b>	<b>5 ° (refrigerated)</b>	<b>-18 ° (frozen)</b>
<b>15 % (air-dried in HI)</b>	<b>1.0</b>	<b>8.8</b>	<b>-</b>
<b>8 % (USDA recommended moisture level)</b>	<b>16.2</b>	<b>143</b>	<b>587</b>

# Viability of HEDYOTIS TERMINALIS (manono) seeds after storage



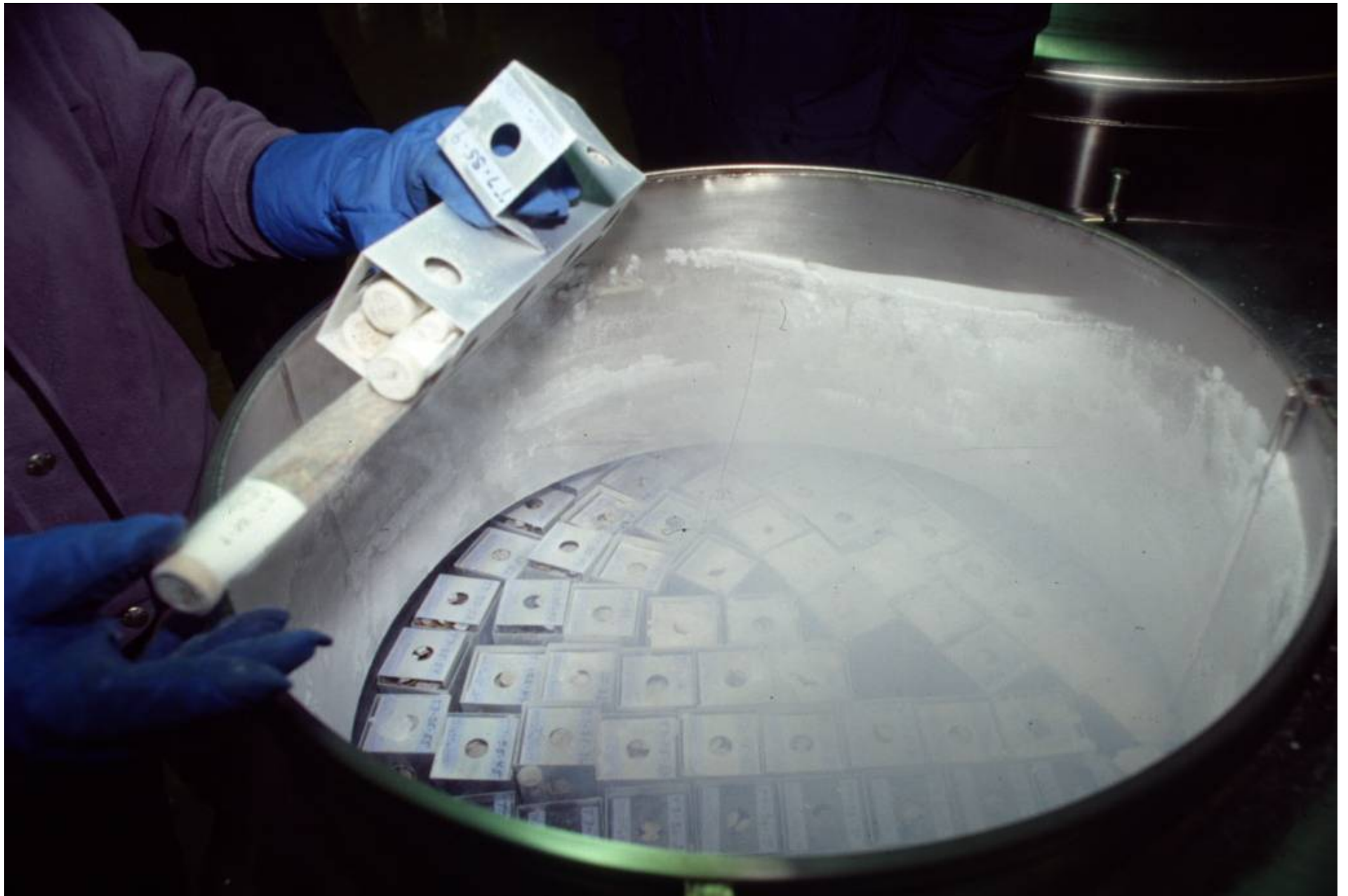




**INSIDE THE SEED VAULT AT 0° F/-18° C**



**BARLEY (middle shelf) and RICE (lower shelf) in frozen storage**



**LOOKING INTO THE ACCESS PORT OF A CRYOGENIC STORAGE TANK**





B

597  
KHITOM KHAD  
191-42-3

804  
PAH DAM

704





The End

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## **GUIDELINES FOR SUCCESSFUL SEED STORAGE**

- 1. Determine whether the seeds can be stored. (Not all seeds can be stored successfully.)
- 2. Collect healthy, ripe seeds.
- 3. Separate and clean the seeds.
- 4a. Dry the seeds to the correct moisture level for storage.
- 4b. Meanwhile, germinate some of the seeds to make sure that they are good.
- 5. Pack the seeds for storage.
- 6. Store the seeds.
- 7. If you store the seeds for a long time, germinate a sample from time to time to make sure that they are still good.
- 8. Prepare the seeds for sowing: Seeds stored very dry need preparation before sowing.
- 9. Sow the seeds.

While going through all of these steps, keep good records.