Seed Storage and Testing Procedures Used at Saratoga Tree Nursery, New York State Department of Environmental Conservation

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seed germination, conifer seeds, hardwood seeds

The New York State Department of Environmental Conservation Saratoga Tree Nursery maintains over 120 ha (300 ac) of seed orchard and seed production areas. With the help of New York State Corrections crews, cones and fruits of desired species are collected when ripe. Cones and fruits are transported back to the nursery, assigned a seedlot number according to species, stored on drying racks for about 3 months, and processed in the seed extractory located at the facility. All corresponding data is recorded for each seedlot; all germination tests are performed by nursery staff.

Seed Record Sheet

A Seed Record Sheet (Figure 1) is completed for each seedlot, recording information pertaining to species, origin of cones or seeds, extraction data, storage data, and seed test summary.

Conifer Seed Testing

Recommended procedures for seed testing at the Saratoga Tree Nursery are based on Heit and Eliason (1940) and have been modified slightly to

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SEED RECORD

SPECIES _____ _____ _____
Common Name Scientific Name Variety or Strain

SEEDLOT NO. _____ S.O. FILE NO. _____ S.P.A. FILE NO. _____ S.C.A FILE NO. _____

Received From _____

Date Received _____

Total Cones in Lot _____ hls Total Seed in Lot _____ kg _____ gm
_____ bus _____ lb _____ oz

ORIGIN OF CONES OR SEEDS

Collected by _____ Date _____
Place Collected _____ _____ _____
Country State or Province Locality

Region, Area, Proposal _____
Altitude _____ meters _____ feet
How Collected: Standing Trees _____ Felled Trees _____ Ground _____
Squirrel Cache _____
Age of Seed Trees _____
Volume of Cones or Seeds in Lot as Stated by Vendor or Collector _____
Volume of Cones or Seeds in Lot as Measured by Nursery _____
Current Seed Crop: Light _____ Medium _____ Heavy _____
Remarks on Cones as to Insects, Disease, etc. _____
_____

EXTRACTION DATA

Dates Extracted _____ Extractory Operator _____
Air Dried _____ Kiln Dried _____ Kiln Temp. _____ No. Hours in Kiln _____
Remarks on Extraction _____

STORAGE DATA

Date Seeds Bottled and Stored _____ Storage Temp _____
Moisture Content _____ Bottled and Stored by _____
Remarks on Storage _____
_____

SEED TEST SUMMARY

Total Germination _____ % in _____ Days Purity _____
No. Seeds per lb of Clean Seeds _____ Weight of Sample _____ gm
No. Seeds in Sample _____ Weight of 1000 Seeds _____ gm
Remarks _____
_____
Test Date _____ Tested By _____
Report Made by _____

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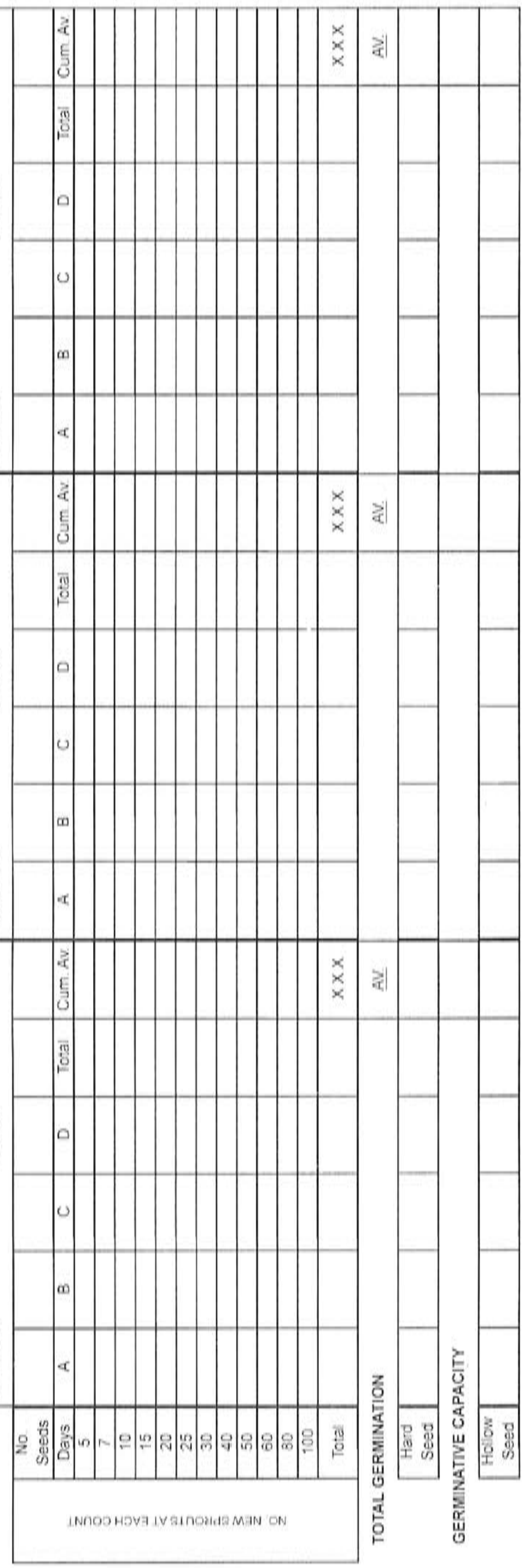
Figure 1. Seed record sheet for Saratoga Tree Nursery.


STATE OF NEW YORK
CONSERVATION DEPARTMENT

SEED RECORD - REPEAT TESTS

Species ______ Lot ______ Seed Test No. ______

		TEMP.					°F	TEMP.					°F	TEMP.				°F
		STARTED		ENDED				STARTED		ENDED				STARTED		ENDED		
NO. NEW SPROUTS AT EACH COUNT	No. Seeds																	
	Days	A	B	C	D	Total	Cum. Av.	A	B	C	D	Total	Cum. Av.	A	B	C	D	Total	Cum. Av.
	5																		
	7																		
	10																		
	15																		
	20																		
	25																		
	30																		
	40																		
	50																		
	60																		
	80																		
	100																		
	Total						X X X						X X X						X X X
TOTAL GERMINATION							AV.						AV.						AV.
	Hard Seed																		
GERMINATIVE CAPACITY																			
	Hollow Seed																		

Figure 2. Germination data sheet for Saratoga Tree Nursery.

meet the needs and equipment of the nursery seed extraction facilities. The recorded information is used when calculating sowing rates and referenced if productivity problems arise with seedlings produced from that seedlot.

Seed tests that are routinely conducted fall into 4 categories: 1) removal of a seed sample; 2) purity and number of seeds/kg (seeds/lb); 3) moisture percentage tested by either loss-upon-heating or a Dole moisture content meter; 4) germination percentage estimated by an unstratified (dry) test, a stratified (wet) test, or a cutting test.

Removal of a Seed Sample

When examining a population, it is necessary to conduct tests on a representative sample of that population. In testing seeds, a random sample is removed from the seedlot using a seed sampling tube and placed in a plastic tray. This sampling procedure may be repeated several times to obtain a true representative sample from a very large lot (90 kg [200 lb] or greater) or to obtain enough seeds for testing a small lot (less than 11 kg [25 lb]).

Purity and Number of Seeds/kg (Seeds/lb)

The determination of purity and the number of clean seeds/kg (seeds/lb) are done together in one operation. Initially, 10.0 g (0.35 oz) of seeds containing impurities are removed from the extracted seed sample. Impurities consist of small pieces of cones, bark, pitch, foliage, and so on. Seeds are counted into piles of 100, keeping all impurities in a separate pile. These seeds can be used later in germination tests. Once all seeds are counted and impurities separated, the impurities are weighed to the nearest 0.01 g. The purity is then calculated as follows:

% purity = (weight of sample — weight of impurity) x 10

For example:

(10 g sample — 0.39 g impurity) x 10 = 96.1% purity

Germination

The Saratoga Tree Nursery does germination tests on all conifer seedlots (Figure 2). Tests on hardwood and shrub seedlots are performed if time allows. A cut test is at least performed on these lots. For each seedlot being tested for germination capacity, a 30-day stratification test and a 30-day warm test is performed. Tests are performed in a germination chamber. At this time, it is our goal to test all lots (new lots or those in storage) once within a 4-year period. It is recommended that seedlots be tested at least 6 months prior to use. When performing seed testing it is imperative that set procedures are followed. A simple oversight, such as dirty utensils or contaminated testing trays, can affect results dramatically.

Seed Storage

After testing, unused seeds are stored in 19-L (5-gal) glass water bottles. These containers are corked and sealed with wax. The storage temperature is set at -2 °C (28 °F). Conifer and shrub species are stored for up to 10 years. Hardwood species are only stored for a maximum of 3 to 4 years. Currently, over 450 seedlots of various species are in storage at Saratoga.

Testing Data

Information obtained from germination testing before outplanting can mean the difference between a successful planting or failed crop. As the cost of soil treatment increases, nurseries can no longer afford to plant seeds for which potential viability is not known. As an example, the Saratoga Nursery spends over US$ 2,960/ha (US$ 1,200/ac) on soil fumigant/treatment materials alone. If your facility is unable to perform your own testing, it would be wise to have these tests done at a certified seed testing facility.

References

Heit CE, Eliason EJ. 1940. Coniferous tree seed testing and factors affecting germination and seed quality. Geneva (NY): New York State Agricultural Experiment Station. Technical Bulletin #255. 45 p.