Comments on Value and Purpose of Laboratory Testing of Tree Seed and Responsibility of a Seed Laboratory

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It pays to have every seed lot tested by an experienced seed analyst before sowing the seed in the nursery. After 30 years of testing conifer, hardwood, and shrub seed, we are still learning new techniques, better methods, and are observing additional germinative characteristics on less common and exotic species. Last year, at the New York laboratory, we tested over 300 species of tree and shrub seed for germination from all over the world, including 49 different pines, 18 different spruces, and 39 different eucalypts.

Laboratory Tests

The germination percentage of each seed lot or the true planting value is probably the most important finding in a laboratory test. Only those strong, healthy seedlings with vigorous radicles should be counted for germination, since weak, abnormal seedlings will not survive in the field. Keen judgment is often necessary to detect these weaknesses and abnormalities.

The percent of pure seed can be determined. This is important, for comparison, when poorly cleaned seed lots are purchased or sold.

Other valuable information is revealed in laboratory tests.

A. Many tree and shrub species can be identified by laboratory seed germination characteristics and response. This information will detect mislabeled seed for control officials and protect the user from planting the wrong kind of seed. The New York laboratory has found the following species mislabeled as to kind:

Labeled	Found to be
Black Hills Spruce	Colorado Blue Spruce
Balkan Pine	Austrian Pine
Chinese Pine	Japanese Red Pine
jack Pine	Shortleaf Pine
Japanese Black Pine	Japanese Red Pine 1/
Scotch Pine	Aleppo Pine
Douglas-Fir (Blue from Colorado)	Douglas-Fir (Caesia or viridis from Montana or British Columbia)
Coral Berry	Honeysuckle
White Mulberry	Lonicera Species

1/ Seedlings of Japanese red and Japanese black pine can be segregated in the germinator by stem color, while the seed itself is difficult to always identify.

How many nurserymen would have detected these mislabeled lots? We can cite some sad experiences of mislabeled seed sown by nurserymen which went undetected until two years of age. It pays to know your seed

B. Geographical sources can be identified (in some species) as color, size, shape of seed, markings on seed, or germination characteristics may vary. Scotch pine from Sweden and Finland, will run 94,000 to 104,000 seed per pound, while seed from Spain will run 32,000 to 49,000 seed per pound. Douglas -fir seed sources can be segregated by degree of dormancy and, to some extent-, by seed size,

C. Certain seed injuries , which may cause weak germination, can be detected in laboratory testing. Old seeds of weakened vitality are readily distinguishable from strong, healthy seedlings when tested on a blotter, since both top and root can be judged for strength and root-top ratio. Extraction injuries may be detected in conifer seeds. These injuries may be caused by harsh treatment in the dewinger which damages the root cells affecting root growth and development.

D. The moisture content of the seed can be determined . This is of great importance for maintaining maximum viability in storage. Most conifer seeds should have a moisture content between 5%-8% for optimum long-term sealed storage.

E. Seed per pound figures should be determined for each seed lot so the user can calculate sowing rates for optimum density. Do not take seed per pound figures from averages or ranges found within a species as listed in various bulletins or books. They may be extremely inaccurate for your particular, seed lot.

F . The degree of dormancy in a species or a particular geographical seed source can be detected and proper cultural practices recommended for maximum field germination. Some species should be fall-sown, others spring-sown. Some species will germinate at a colder temperature than others (even if dormancy is not exhibited). For example, Norway spruce and Colorado blue spruce will germinate at much colder temperatures than red pine. Thus red pine can be sown in fall to good advantage, while we would recommend the two spruces be spring-sown (pregerminated seed in fall-sown beds might be killed during the winter and a poor stand result). The Montana and British Columbia sources of Douglas-=fir should be fall-sown for best results because they are dormant while the Colorado and Arizona sources should be spring-sown because they are not dormant.

All dormant conifer species such as Bosnian pine, white spruce, white pine, red spruce, Serbian spruce, Japanese spruces, all of the true firs (Abies), Japanese larch, and hemlock should be fall-sown for maximum germination in the spring. The most dormant species, Bosnian pine, white pine, hemlock, balsam and frazer fir, should be sown earliest in the fall. The writer has had good success sowing some Scotch pine seed sources and even the blue strains of Douglas fir in late fall (November 20-30) at Geneva, New York, without pregermination harm. Consult the seed analyst who tested the seed, if you are in doubt regarding degree of dormancy involved.

G. Percentage of degree of hardseededness can be determined when it exists in tree and shrub seed. This information will show the need for scarification or acid treatment in order to overcome this condition and secure maximum germination of all viable seed in field sowings. Black locust seed lots vary in the degree of hardseededness. Laboratory tests demonstrate this percentage may vary from a low of 20%-30% to a high of 70%-80%.

The Responsibility of a Laboratory

Having tested tree seed for over 30 years and studied germinative characteristics of several hundred species, we believe the seed laboratory has responsibilities to the seed collector, nurseryman, seed dealer, taxpayer, and control official. These can be listed as follows:

A. Be equipped with modern germinators accurately controlled for a wide range of termperatures and artificial light conditions so as to place each species under optimum conditions.

B. Germinate seeds by the treatment and methods which will give accurate, maximum germination.

C. Provide the best service possible, in the shortest period of time, to persons submitting samples for test. Preliminary results can many times be provided (within tolerance of final results), so the nurseryman or seed dealer can sow or complete a sale at his earliest opportunity.

D. Most conifer seed can be tested within 10-30 days. Today, long stratification periods can be reduced (embryo excision tests will give results on extremely dormant seed in 10-14 days).

E. Service charges for tests should be kept to a minimum. This means efficiency within a laboratory, incorporating time and cost saving procedures and equipment. High test costs will

prevent the nurseryman, seed dealer, or collector from testing all seed lots when many lots are involved. With small seed lots, high test costs may be more than the price of the seed.

New York's laboratory was a pioneer in tree seed testing for its residents even before 1939, when our tree seed law became effective. We test tree seed for seed dealers, collectors, and nurserymen from other states because we feel there is a need for this service. At the same time, these tests have given us research data on the germinative characteristics of hundreds of tree species. Thus, we progress and establish better testing methods , possibly rendering still better service to the users of tree seed.