

SEED TESTING

The Eastern Tree Seed Laboratory Program

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The Eastern Tree Seed Laboratory, the only one of its kind in North and South America, is located near Macon, Georgia. This Laboratory had its birth at the Ashe Nursery near Brooklyn, Mississippi. As the demand for seed and seedlings for reforestation increased throughout the South following World War II, it became apparent that the small seed test laboratory at the nursery would be inadequate to meet the demands. Larger seed test facilities would be needed.

The Georgia Forestry Commission, expanding their overall operations near Macon, Georgia, offered a site for the proposed laboratory. The equipment and technical personnel were soon relocated in larger, temporary headquarters on the grounds of the expanding Georgia Forestry Center. Soil Bank funds permitted the construction of the present laboratory and office building in 1959.

The Eastern Tree Seed Laboratory is unique in that we handle only tree and shrub seeds for testing and research. In addition to seed testing, we are actively engaged in the improvement of nursery practices. Although our service test customers cover a wide geographic range, we try to confine our domestic service activities to the area east of and including the Great Plains. We do both service testing and research testing, entering into cooperative studies with other private, state, and federal agencies and institutions.

Lastly, and perhaps most significant, we are an organization which answers to four bosses: The Laboratory is operated cooperatively by the Georgia Forestry Commission, the Georgia Forest Research Council, the Southeastern Forest Experiment Station of the U. S. Forest Service, and the Division of State and Private Forestry of the U. S. Forest Service. The Georgia Forestry Commission is responsible for physical facilities, seed test billing, some services, and laboratory personnel.

The Georgia Forest Research Council contributes toward the salary of the Director and Lab Technician for the research work they do. They are also responsible for some services and publications of some of the laboratory findings.

The Southeastern Forest Experiment Station at Asheville, North Carolina, furnishes a seed physiologist responsible for the basic research work. The Station is also responsible for technical guidance on research activities, and assistance in publication of research findings,

The Division of State and Private Forestry of the Region 8 Office of the U. S. Forest Service in Atlanta, Georgia (now the Southeastern Area of S&PF, Edit.), is responsible for providing technically trained supervisory personnel, travel, and miscellaneous operating funds, and the publication of some laboratory reports .

We can honestly say that they are a great bunch to work for and with! We are pleased with the progress that can be made under this cooperative arrangement.

We've talked about us enough - now, how about you? Well - YOU, the seed test customer or cooperator, are our most important interest!! You are always welcome at the Laboratory -- in person, by mail, or by phone.

When a typical seed sample is sent to the Laboratory for service testing, it is given a test number. Samples are received in all sorts of containers; for best results , we urge the use of a moisture-proof container. The sealed tin can, polyethylene bags properly secured, or sealed bottles adequately packed against breakage are excellent for shipment of your test samples

Proper labels should be affixed to the exterior of the container. Ideally, one should also be included within each container.

The test request sheet is reviewed by the Director to determine whether special information is needed. In the main Laboratory, each sample is thoroughly mixed by a Gamot Divider and tested for moisture content. Other determinations as requested are then performed including: purity, seeds per pound, and full seed percent. Our Laboratory, as a member laboratory of the Association of Official Seed Analysts and the International Seed Testing Association, adheres strictly to the seed test regulations advocated by these organizations.

Test Methods and Equipment

A solid medium of sterilized sand and perlite (50-50 by volume) is prepared each day. A known amount of water is added according to the species to be tested. The medium is placed in clean plastic containers. Six containers of 100 seeds each constitute a test. A vacuum counter is generally used to place the seed on top of the medium. Slight pressure on the vacuum head presses the seed into the medium.

The boxes are placed on shelves in a well-lighted, temperature-controlled , germination room. A 16-hour day-length is maintained for most testing. Species which often exhibit seed dormancy are also stratified and tested later. Black spruce, for example, does not always have a seed dormancy and is therefore generally tested unstratified and after a 60-day stratification period.

Polyethylene or cloth bags are used for the stratification test. We stratify the sample in the same way you stratify. Although, in most instances, there is no difference between polyethylene and moss stratification, we do not wish to introduce any additional source of error into the tests. That is why you must tell us how you stratify.

Following the proper length of time in the germination room, the boxes are removed to the counting room where the full seed percentage is determined by cracking the ungerminated seeds remaining on the medium. If no additional information is requested or required, the test results are analyzed and a final laboratory report is sent to you, the seed test customer.

Should the seed lot tested receive additional treatments after the seed sample has been drawn (such as recleaning after stratification), the nurseryman must take this into account when applying our laboratory test results to his computations of sowing rate. If this is not done, actual field results will be at variance with the expected results.

As a free service, available to our seed test customers, we believe it is important to check for seed damage during extraction. Mechanical injury to the seed may occur during the extraction process when new methods or machines are put into use. To help the nurserymen provide better seed through proper seed handling, we ask that he draw a seed sample after each station or step in his seed extraction procedure. These samples should be sent directly to the Seed Laboratory for analysis. Mechanical damage can be ascertained from a microscopic examination and the results of a germination test. If you are not a customer, we would be happy to make such tests at a reduced cost.

Field Counseling and History Plots

Whenever possible and practical, we follow up on special problems or circumstances which may attend the seed lots we have tested. Should the nurseryman need additional help, we want him to call us for assistance. Often a phone call or a detailed letter will answer his questions. If this is inadequate, a visit to the problem nursery may be possible.

We strongly recommend the use of history plots in every forest tree nursery. I developed this method for use in inventory. It was first used and refined while I was on the staff at the W. W. Ashe Nursery in Mississippi. If you are not familiar with this procedure, it is reported in the February 1964 issue of TREE PLANTERS'NOTES. Although you may not be able to use it as an inventory tool, it will help you determine a survival factor,

1/ Reprints are available upon request from our Laboratory.

Billing System

For those of you who are old test customers, as well as for the new customers we seek, another bit of information will be welcome news. A new billing system is now in effect. Quarterly bills rather than an annual billing for service tests should facilitate your book-keeping. We are announcing a fixed charge for each test, so you know in advance what you can spend out of your year's budget for seed testing. This change is based upon an analysis of test charges for the past four years. Subject to annual change as dictated by operating costs, we believe we have arrived at a cost figure which should remain fairly constant. Although we recommend a service test made following seed extration and again just prior to sowing, you should know we operate year-round. We will accept seed for testing at any time.

Research Testing

So far , we have considered only service testing. In addition to our Director and Assistant (both spend half time on seed research), we have a seed physiologist, Dr. C. Cotrufo. He is currently studying the factors related to seed dormancy. He has a well-equipped laboratory and an experienced laboratory technician to assist with this research. Studies conducted at the laboratory have included several species indigenous to the Northeastern States .

A cooperative study with the Chittenden Nursery in Michigan, showed that green white pine cones should not be sotred in piles following collection. Due to the high moisture content, they probably generate enough heat in the pile to injure the seed.

A 5-year storage study indicated that white pine seed should be stored between 15° and 25°F. A moisture content of less than 12 percent is best.

With the cooperation of the New Hampshire Forest and Recreation Department, we have worked out testing methods for many of the Northeastern species . The Eastern Tree Seed Laboratory is now completing tests on Norway spruce and balsam fir in preparation of moisture charts for use with the Radson Moisture Meter. This work is being done cooperatively with the State of New Hampshire which donated the seed. This brings the number of calibration charts now available to nine. (The others are for slash, loblolly, longleaf (both winged and dewinged), shortleaf, white, and red pines, and white spruce.)

In cooperation with the Virginia Forest Service, we found that Eastern red cedar germinated better if it was depulped and allowed to dry for 7 days. A common practice is to depulp the seed and

place it immediately in stratification. This practice does not permit the seed to dry out. Apparently, some pre-stratification drying of the seed is desirable. This pre-drying may be associated with an after-ripening process.

Research work on several southern pines has provided clues and answers to many problems which nurserymen in the south are experiencing. We are anxious to extend our research and service testing activities to include your northeastern species, so do get in touch with us with your seed problems.

The use of X-ray photography as a research and service testing tool is under investigation. This technique has been used successfully abroad. Procedures specific to our native coniferous and hardwood species need to be determined.

Direct Seeding Studies

Cooperative studies of interest to nurserymen, as well as direct seeders, include such factors as pre-sowing soaks, stratification requirements, repellents, etc. For instance, the new Arasan 42S gives better results than the older Arasan 75W. It is also safer to apply because it is dustless. (A latex sticker is needed if additional chemicals are used in combination with the Arasan 42S.)

Tests conducted recently on water tupelo seed from North Carolina illustrate an interesting point. Three different lots of unstratified seed when germinated, exhibited some variation between lots. However, greater differences, apparently caused by damage in the depulping process, became evident when stratified seed was tested. The different stratification treatments on the three lots demonstrated that the old accepted treatment apparently had a decided detrimental affect on the injured seed lot. The old way is not always the best way

We are interested in and will perform extensive research tests on selected species on a cooperative basis. This can be done at a reduced cost to the cooperator, or we will make service tests on these new species while making limited research tests under the resources of our own research programs.

Forest Tree Improvement

The vastly expanding efforts of forest tree improvement deserves attention. As more seed production areas and seed orchards come into production, adequate seed test methods must be ready. We expect all sorts of seed. The State of Georgia has already marketed some 750,000 seedlings from seed orchards. An additional 2,000,000

seedlings will be available during the 1965-66 planting season. Within the next few years, hundreds of acres of seed orchards throughout the South will come into seed production. We are anticipating increased service testing activity as these orchards become increasingly productive.

Publications

From time to time, our staff puts out special research reports. We publish an annual report which also includes items of technical interest. We hope to eventually put out a semi-annual Eastern Tree Seed Laboratory Newsletter. Any or all of these publications are free. Some are on display here. If you are not already on our mailing list, we would like to have you. If you are not one of our service test customers, we would like to have you. If you have any special tree or shrub seed problems, we would like to help you. And if you are ever down our way, remember it's -- the Eastern Tree Seed Laboratory near Macon, Georgia. Stop by, we would like to have you!