REVIEW OF NURSERY RELATED EQUIPMENT DEVELOPMENT PROJECTS

by
Richard Hallman
Forester
Missoula Equipment Development Center
U. S. Forest Service
Missoula, Montana

ED&T 2522 - Precision Nursery Seeder

Problem

The present seeding equipment being used in the seedling nursery sows an erratic bed density. The number of seeds sown per square foot will vary from 20 to 100 when 40 per square foot is desired. A seeder developed by the Wind River Nursery is presently being used. A precision seeder is necessary to fully use the genetically improved tree seed. Genetically improved seed is now, and will be for some time, available in very limited quantities. Better utilization has to be made of the available seed. The present method produces 15 to 25 percent cull trees. Better control of bed density would probably shrink this to under 10 percent. This would reduce the time spent in sorting out cull trees while packing. Research has shown uniform bed densities can produce a better and more uniform tree. A better tree will increase outplanting survival, thereby reducing the number of trees needed to plant each acre and also reduce the amount of replanting. The nursery would be able to make a better estimate of area needed for sowing, reducing the cost of preparing beds that will not be sown.

Project Objective

The objective of this project is to help make available to the forest tree nurseryman a seeder that will permit precision sowing of tree seed in nursery beds.

Work Done to Date

This project began in July 1974. A survey was made of all Federal nurserymen to define the problem. The survey provided answers to questions such as the average size of seed lot sown, species used, range of sowing densties and desired accuracy. In general the replies indicated a need for a sowing accuracy of + 5 percent of density per sq ft and + 30 percent on spacing. A market search was then conducted to attempt., to find a seeder that could meet the requirements determined in step 1. Five seeders were selected for lab tests; Wind River (used for the control sample), Moden pneumatic (University of Idaho), Stanhay, Dahman, and the Ventura. Used a 12-inch wide 3M tape to catch the seeds during the tests. A statistical analysis of the test results is being conducted. The use of the Union Carbide tape seeder tests at Wind River Nursery was also monitored.

Future Work

Two more seeders, the Oyjord (from Norway), and a seeder recently developed by the New Zealand Forest Service will be lab tested. The more promising

of the seeders tested will be field tested for accuracy and general suitability. When these tests are completed we will know if there is a suitable seeder in existence or if modification or a complete new design is needed.

ED&T 2547 - Intensive Nursery Culture

Problem

Two distinct methods of producing forest tree seedlings exist in the United States. Greenhouse production of containerized stock now accounts for approximately 5 percent of the industry's annual production. This percentage undoubtedly will increase as the system is perfected. However, bare root stock production from conventional nursery beds is likely to provide the bulk of planting stock used in this country for the foreseeable future.

Project Objective

The objective of this project is to provide the engineering expertise necessary in the development of equipment and techniques to help nurserymen grow the type of seedling they want as economically and inexpensively as possible.

Work Done To Date

This project began August 1974. To gather background information MEDC personnel visited bedhouse operations at Weyerhaeuser's Mimi Nursery, the Forest Service Nursery at Bend, and Washington State's Webster State Nursery at Olympia. Later MEDC personnel met with Coeur d' Alene Nursery and R-1 Timber Management personnel to set a course of action for the project, It was agreed that the first step would be to determine the biological response of seedlings to various levels of environmental control. To accomplish this, two aluminum bow poly covered bedhouses, 22' x 96', have been purchased for installation at the Coeur d' Alene Nursery for spring 1976 sowing. Instrumentation for the houses has also been purchased.

Future Work

Six species will be sown in the bedhouses approximately 1 month prior to normal sowing of about May 1. A similar crop will be sown at the regular time and cultured in a normal manner for control. Careful monitoring of crop growth will be conducted to determine the difference, if any, between the bedhouse crop and the control crop. MEDC personnel will also work with Bend Nursery to monitor this year's bedhouse grown ponderosa pine crop.

ED&T 2548 - Equipment for Processing Small Seed Lots

Problem

Because of rapidly expanding tree improvement programs many nurserymen must process a greater number of small seed lots each year. Most nurseries have equipment geared for handling large seed lots and have found this equipment unsuitable for the efficient processing of small lots. One problem is the difficulty of cleaning large equipment between batches. Another problem is that some large processing equipment such as brush dewingers may not work efficiently with small loads. As a result of these problems, most Federal nurserymen contacted in a recent questionnaire replied that there is a need for development work in this area.

Project Objective

The objective of this project is to help make available to nurserymen reliable equipment suitable for processing small seed lots in high output nursery operations.

Work Done to Date

Project began January 1974. The first effort was to survey all Federal nurseries to define the problems associated with processing small seed lots. In addition, seed testing laboratories and seed processors were visited to gather background information. A project record was written to cover the investigation. A catalog entitled Equipment for Processing Small Seed Lots was also published. The purpose of publication was to acquaint nurserymen with equipment that is commercially available from both domestic and foreign sources.

Work for FY 76

The first year's investigation revealed that there was a need for a better dewinger for use in processing small seed lots. To meet that need several prototype dewingers will be built and tested with selected tree species. Testing for purity and germination will be done in cooperation with the Eastern Tree Seed Lab. From information gathered in the test a final design for a small seed lot dewinger will be started.

ED&T 2549 - Monitoring Greenhouse Environments

Problem

In the past 5 years there has been a dramatic increase in the number of greenhouses built to produce forest seedlings. Many improvements have been made in structures, coverings, and accessory equipment. If there is one area that has been relatively neglected, however, it is the monitoring of the greenhouse environments. To date most greenhouse operators have been too busy with the routine activities of their operation to concern themselves with optimizing environmental control. Researchers, especially those engaged in greenhouse production of horticultural crops, have demonstrated that the selection and maintenance of proper growing environments can markedly improve crop performance. The key to maintaining the optimum growing regime is good instrumentation. A properly instrumented greenhouse can permit a grower to produce the best crop possible for the money he has available for fuel, electricity and related expense.

Project Objective

The objective of this project is to help make available to greenhouse growers of tree seedlings, equipment and techniques that will allow them to monitor all major aspects of the greenhouse environment.

Work Done to Date

This project began in August 1974. In October MEDC personnel met with representatives from PNW Forestry Sciences Laboratory, Corvallis, Oregon, Siuslaw National Forest, and Oregon State University to discuss the project. It was decided to conduct the equipment tests at the Siuslaw National Forest greenhouse complex at Beaver Creek. The electrical engineering department at OSU was contracted to conduct a feasibility study to determine: (1) which parameters of a greenhouse environment should be measured, (2) how they should be measured (automatic or manual), (3) frequency and precision required, and (4) the best type or form of output data. The study was completed and the report received in August 1975. The report outlines three different levels of sophistication of monitoring, ranging from straight manual operation to automatic operation with machine readable computerized output.

Future Work

After the level of sophistication of monitoring desired is determined by the Division of Timber Management, further contract work is planned to design and install a pilot installation at Beaver Creek. After the monitoring system is perfected, a report with drawings and specifications will be published to enable other greenhouse operators to instrument their facility.

ED&T 2669 - Nursery Equipment Catalog

Problem

A prevalent problem forest nurserymen face is how to stay abreast of new equipment and techniques. Many instances can be cited where a nurseryman has spent time and money developing a piece of equipment when a similar version already existed elsewhere. Publications and annual nurserymen's meetings are helpful, but nurserymen need specific information on available equipment.

Project Objective

The objective of this project is to provide forest nurserymen with detailed information about available equipment suitable for use in their industry.

Work Done to Date

This project began in January 1975 at the time MEDC's survey of nurserymen's equipment problems was completed. The survey indicated that many nurserymen asked for the development of equipment that already existed. To help remedy the situation it was decided to assemble a general catalog of nursery equipment. Approximately 150 manufacturers were contacted to gather information concerning commercially available equipment. In addition about 25 nurserymen who listed custom-built equipment on the survey questionnaire were contacted.

Work for FY 76

The market search will be completed and the material compiled into a rough draft format. It is planned to have the rough draft catalog reviewed by all Federal nurserymen before it is put into final form.

ED&T 2670 - Cone and Seed Harvesting Equipment

Problem

In a recently completed survey of all Federal, State, and private nurserymen, the problem of harvesting cones and seed was listed as their third highest priority. In the South and Southeast this problem is one of harvesting seed from orchard grown southern pine species with persistentcones (principally loblolly pine). In other sections of the country, where seed is harvested primarily from seed production areas or from wild stands, conventional cone shaking or similar equipment cannot be used, usually because of rough and uneven terrain. The problem therefore is diverse and widespread. Numerous tools and techniques will be needed to solve a problem of this nature.

Project Objective

The objective of this project is to provide those working in tree improvement with the necessary equipment to efficiently harvest seed from selected trees, be they in orchards, seed production areas, or in wild stands.

Work Done to Date

This project began in January 1975. MEDC personnel visited with Forest Service and with State forestry personnel in the Southeast to gather background material. From this initial contact it was learned that the North Carolina State-Industry Tree Improvement Cooperative was about to field test a prototype vacuum seed harvester. MEDC personnel attended the demonstration held in a loblolly seed orchard in Virginia. It was evident that the machine had good potential for successfully vacuuming loblolly seed from a groomed orchard floor. However, several modifications were needed. MEDC was invited to join the Coop in further testing and as a result the Center ordered a second prototype model for its own test program.

Future Work

The prototype vacuum pickup machine will be delivered to MEDC by mid-September. It is planned to conduct tests of the machine later in the fall in Louisiana and Georgia. A project record will be written to describe this work. More investigation must be done to determine which specific areas of cone and seed harvesting should be looked at next.