Container Program Pays Big Dividends At Alberta's Provincial Tree Nursery

by

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With the increasing demand on our forest resources, there has been a corresponding demand for tree seedlings to regenerate cutover areas. Containerization of these seedlings is playing a very important role. In this article, we have outlined a method we use to make our container program run more efficiently and at a lower labor cost.

History

Although many container systems were tried, the one found to be best suited to our program was the Spencer-Lemaire book type. The big drawback to this container, however, was the length of time it took to fill one. In the past, this filling has always been done by hand, but the hand filling method was slow, involved more labor, and as a result was very costly. With the production in 1973 more than triple that of the previous year, we were hard pressed to keep up with production schedules. Since production in 1974 will double the 1973 figure, we were in a position where a mechanical method of filling the containers was necessary.

Filling Methods

Several different methods were tried before we finally arrived at the one we have now adopted.

One method used was a 'slurry method' in which the peat moss was mixed with water until it was about the consistency of liquid concrete. By pouring the peat into the containers, we found that it tended to bridge up and not settle all the way to the bottom. A 'thumper table' was then incorporated to shake the peat down into the container, but this method also tended to shake a great deal of peat out of the bottom. Rocking the trays back and forth by hand seemed to work but was more laborious and tiring, so a 'vibrating table' was made to rock the trays. Although this helped, the slurry method was not as efficient as we had hoped and was very messy to work with.

We then tried simply dampening the peat and shaking it down into the containers with the shaker table. This method worked very well so a series of tests was made to increase efficiency in both production and labor.

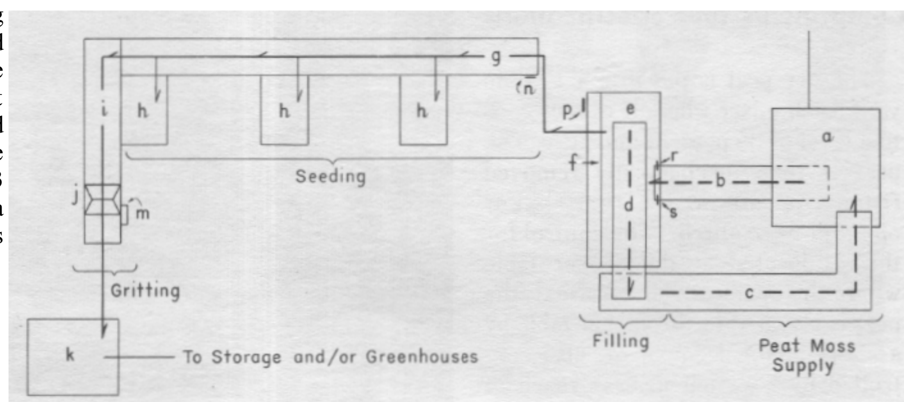

FIGURE 1 - MECHANIZED CONTAINER SYSTEM, FLOW DIAGRAM

a Batch Mixer
b Inclined Conveyor
c Inclined return Conveyor
d Short Conveyor
e Shaker Table
f Thumper Pipe
g Seeding Conveyor
h Seeding Tables
i Sanding Conveyor
j Grit Hopper
k Pallet
m Hopper Pulley connected to conveyor pulley
n Conveyor Switch
p Shaker Foot Switch
r Batch Mixer Switch
s Conveyor Switch

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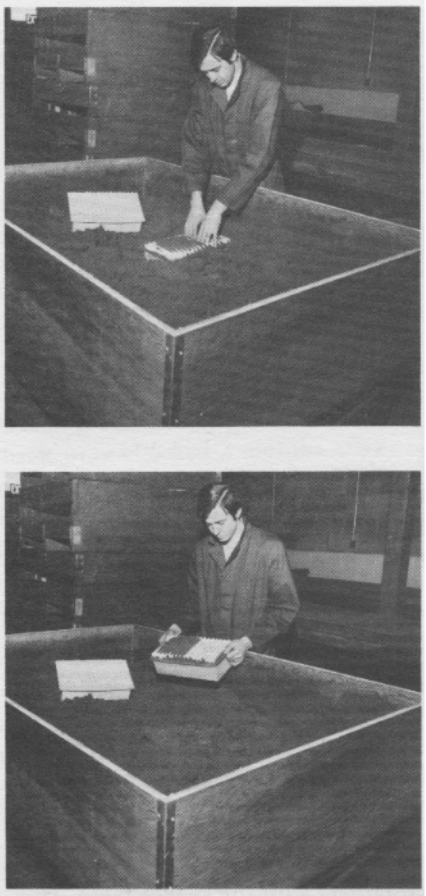

Figure 2.—(Top and bottom) The old method of container filling increased labor and also resulted in uneven container densities.

Components and Specifications

The dry peat is put into a 1 cubic yard batch mixer where it is moistened to a level of 85 percent moisture. The peat is then mechanically removed from the mixer by the shaker operator as required. (The control for this is located at the shaker table where the operator stands). Next. the peat is elevated to the shaker table by a short inclined conveyor, also controlled by a switch in easy reach of the operator. and vibrated into the trays of containers situated on the shaker table. Any excess peat falls through the bottom of the steel mesh shaker deck onto a short conveyor that dumps it on an inclined return conveyor which then returns the peat to the batch mixer. (See flow diagram, figure 1.)

Figure 3.—Filling the batch mixer is first step in process. Peat is mixed to 85 percent water capacity. Meter (left center) controls water input for mixing.

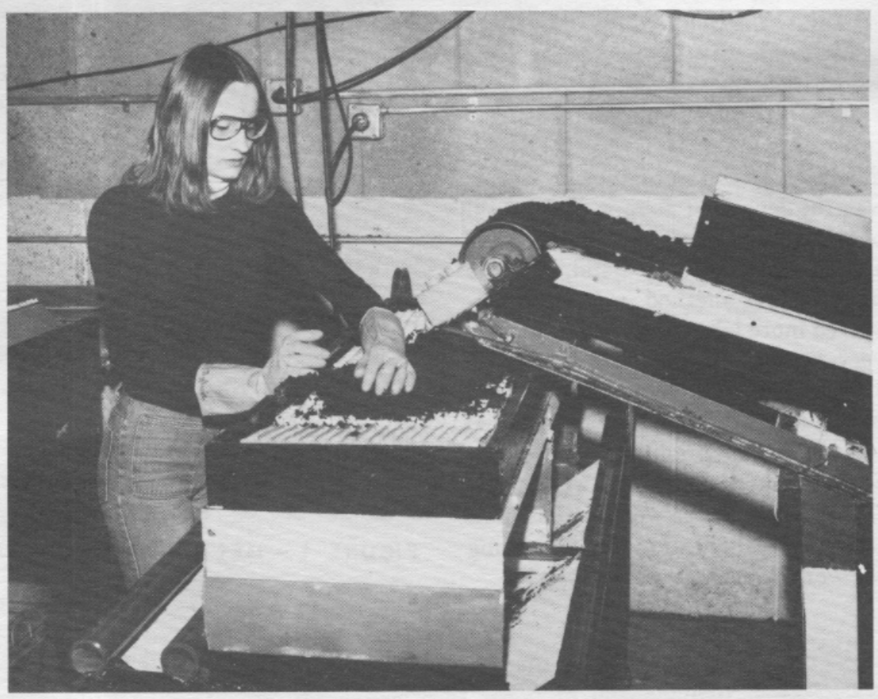

Figure 4.—Once peat is mixed in batch mixer, it drops onto conveyor which elevates to shaker table. Here, the moist peat is spread over the containers. As the peat is shaken down, more is added to completely fill container.

In the process of developing this system, we also worked on a streamlined seeding system in which two conveyors were employed (fig. 1).

The filled trays are placed on the first conveyor and the seeders remove them at their seeding tables. seed them, and place them hack on the conveyor to he transferred to the second conveyors, where an even laver of grit is spread over each tray by a gear-driven hopper located above the second conveyor. The trays are then put in pallets for storage until they go into the greenhouses. This seeding process also allows for a 'quality control' of the filling process, as any containers not filled with the required amount are returned.

This entire process requires five people: two filling containers and three seeding (one of these places the containers into the pallets as they come off the gritting table).

The moisture content of the peat is in the range of 80 - 85 percent by weight. The containers are filled to a density of between .100 - .110 gm./cc, which we feel is the optimum for our growing requirements.

Four to five seeds are seeded in each cavity since a time and motion study showed that the cost of thinning was less than the cost of reseeding. Our seeding also results in a much more even stand of seedlings. To insure that each cavity contains a seedling, a flat is seeded and germinated at the same time as the containers. then transplanted into empty cavities. We have found that very few cavities are empty. We aim for less than 5 percent as a transplant figure. A minimum standard of 85 percent germination is expected for the seed used in our container program and as our efficiency increases so will this figure.

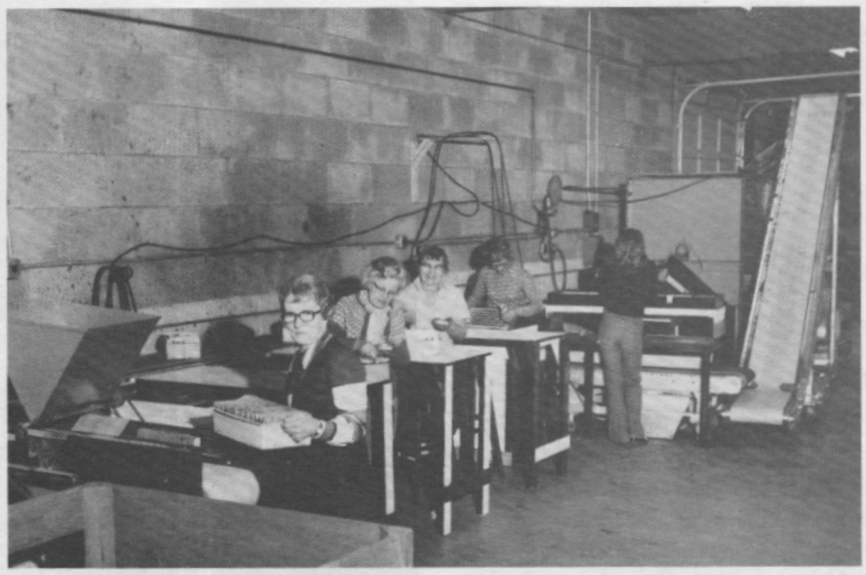

Figure 5—Assembly line showing seeding tables. This allows quality control on filling.

Figure 6.—Gritting with clean, dry sand. Hopper is filled periodically. Excess sand falls into tub to be recycled after cleaning on sieve table. This operation fills 55,000 cavities per day.

Costs

Cost ofdevelopment ofthe container system was kept to a minimum. The conveyors are laundry conveyors which were acquired second hand with only slight modifications required to make them suit our needs. Approximately $1,500. was spent on wages to develop the system. The resulting gain is demonstrated in the figures below, expressed in cost/thousand (M) containers:

This results in a total saving, per

Operation	Cost Hand method	Cost Mechanical method
Filling	$5.64	$1.14
Seeding	2.81	1.73
Total	$8.45	$2.87

thousand cavities, of $5.58

This cost is based on runs of 500 M cavities, at $3.00 per hour average wage.

Our savings for the container program of five million seedlings this year will be $27,500.00. With continued work at this nursery in improving the efficiency of other production areas, we hope that savings can be increased a great deal more.

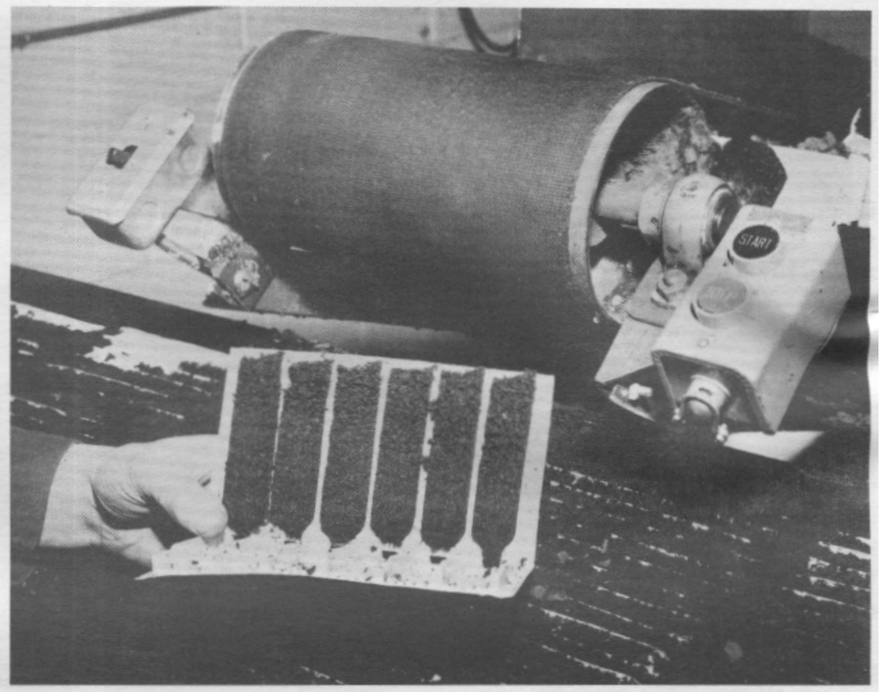

Figure 7.—With this new process moisture can be kept at optimum more easily than the previous method. All peat is used. Maximum distribution of micro and macro sized peat fragments is assured.

News & Reviews

(Continued from p. 18)

Pines Monitor Air Pollution

Eastern white pines are tattletales where air pollution is concerned. Their needles change color or even die when exposed to airborne pollutants such as fluorides, oxidants, and sulfur dioxide. Not all white pines respond in the same way to the same pollutant. however. Some trees are injured by only one of these three pollutants but are resistant to the other two. Such trees may soon be enlisted as detectives to spot areas of air pollution and even to identify which pollutant is on the loose.

Dr. Charles R. Berry of the Southeastern Forest Experiment Station recently conducted a study in which the same seedlings of white pine were exposed for 1-year periods to sulfur dioxide from a power plant in east Tennessee, fluorides from a fertilizer plant in north Alabama, and oxidants (such as ozone) from a metropolitan area in south Maryland. These multiple exposures revealed that some of the seedlings were susceptible only to fluorides, some only to oxidants, and some only to sulfur dioxide. Furthermore, some of the susceptible seedlings were injured only in winter, some only in summer, and others during both seasons. Each of these groups is being propagated to serve as bioindicators of a particular pollutant. Trees susceptible during only one season can even be used to determine when the pollutant is present. Other seedlings in the study proved to be resistant to all three gases. These seedlings will be used to establish resistant lines for seed orchards.

Because they are evergreens, eastern white pines can serve as semipermanent. year-round monitors of air pollution from industrial and other sources. The only maintenance they require is a small application of fertilizer and light pruning once a year. Unlike man-made instruments. they need no electrical power. Such bioindicators will be particularly useful to those who wish to monitor local trends but cannot afford a more complex system.

Details of Dr. Berry's study are reported in an article entitled "The Differential Sensitivity of Eastern White Pine to Three Types of Air Pollution" in a recent issue of the *Canadian Journal of Forest Research.* Reprints are available on request from the Southeastern Forest Experiment Station, P.O. Box 2570, Asheville. North Carolina 28802. (From Forest Research News for the South.)

(Continued on p. 24)