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INSTRUCTIONS FOR HAND-PRESSING WOOD-PARTICLE SEEDLING CONTAINERS

by

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INTRODUCTION

The high cost of conventional methods of reforestation using nursery-grown seedlings has brought about the development of the "container or assisted" seedling method. The container, filled with an appropriate growing medium, supports the seedling and it's root system during growth in the greenhouse, transportation and field planting. This minimizes transplanting shock and gives the seedling a greater chance of survival.

Currently, Mr. F. Endean of the Alberta Forest Research Laboratory is evaluating the suitability of various materials as containers for assisted seedlings. His results indicate that the important criteria for a container are (a) size (1 inch inside diameter x 3 inch long), (b) degradability (1 year or less after field planting), (c) rigidity (must stand handling and field planting), and (d) cost (must not exceed the cost of present commercial containers by more than twice). The most difficult of these criteria to obtain is degradability.

The low resistance to decay that is characteristic of aspen and balsam poplar wood suggests that a wood-particle container manufactured from mill waste of these species could meet the above criteria for a container. It is the object of this paper to summarize the initial work on the development of the wood-particle containers.

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THE MANUFACTURE OF WOOD-PARTICLE CONTAINERS

Initial work resulted in the development of a die that could produce a container with 1 1/2 inch outside diameter and 1 inch inside diameter, and 1 1/2 inches long.

The resin system selected, urea formaldehyde, is water-resistant but breaks down when exposed to high moisture levels. The formaldehyde in the resin was minimized to keep free formaldehyde within the suggested tolerable level for seedlings, i.e., 0-200 ppm (Endean, unpublished.

The test containers were manufactured from Engelmann spruce particles because aspen and balsam poplar particles were not readily available.[2] Two particle sizes were used: 0.5 to 1.0 mm and 1.0 to 2.0 mm. The particles were sprayed at Washington State University with 6 percent Pacific Resin's S 3109A urea formaldehyde resin and 2 percent wax.[3] An external acidic catalyst may be required for aspen and/or balsam poplar for the resin to cure properly.

The wax was added to reduce the water absorption and loss rate. The 1.0 to 2.0 mm particles gave the better container for the pressing cycle because they transmitted pressures more uniformly throughout the length of the container than did the smaller particles. Because of their better performance, the 1.0 to 2.0 mm particles were used for the first set of test containers.

Preliminary laboratory tests have been carried out and sufficient results have been obtained to warrant preliminary greenhouse and field testing

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[2] The particles were supplied by Mr. T.M. Maloney, Wood Technologist, Research Division, College of Engineering, Washington State University, Pullman, Washington.

[3] Maloney, T.M. 1967. Proceedings of the first symposium on particle board. Washington State University, 474 p.

by F. Endean during the summer of 1970 at the Kananaskis Field Experiment Station. The effect of the container on seedling survival and the degree of container degradation, before and after planting, will be evaluated. These evaluations will affect future changes in resin type, particle size, container shape and wall thickness.

The manufacture of wood-particle containers using the pressing die shown in Fig. 1 is outlined in a series of steps listed below.

Preparation of the Die

The die consists of press plate, outside die, center shaft and plunger (Fig. 2). The outside die has a heat tape wrapped around it which is connected to a 0-500 C thermostat connected in turn to a rheostat.

The first step in setting up the die is to activate the heat tape with the rheostat. The thermostat on the die is set so that the desired curing temperature (300-325^{o}F) for the resin is maintained within the die. It will take the die about 30 minutes to reach the required temperature.

When the required temperature is reached, the die is assembled as follows: The press plate is placed over the press hole (Fig. 3). The outside die is placed on the press plate and the center shaft is inserted and secured with the shaft lock bolt. The components of the die are centered with the use of the plunger. Some type of insulation, such as asbestos or teflon, must be used on the press plate to reduce heat loss from the die base. Loss of heat will cause poor cure of the resin in the lower part of the container.

Loading the Die

For uniformity of containers, the volume of particles for each container is measured with a 100- or 150-ml beaker. Larger beakers because of their wide mouths, tend to hamper loading. Each container must be made from one loading only. It has been found that loading and tamping with the plunger causes horizontal boundaries in the container, which leads to failure of the container when it is soaked.

The particles should be loaded into the die as fast as possible to prevent pre-cure of the resin before pressure is applied. Immediately after the particles are loaded, the plunger is inserted into the die and pressure is applied with a hydraulic jack.

Pressing the Container

For uniform quality each container is pressed to stops, i.e. to a given length (Fig. 4). Pressure on the container is maintained for 6 1/2 minutes after the stop is reached. This time is required to ensure satisfactory resin cure.

Removal of Container

The container is removed from the die, after release of the pressure and removal of the press plate, by gently tapping the plunger with a lead block. If the container is very long, it may be necessary to press the container all the way out of the die with the hydraulic jack (Fig. 5).

Finished Product

The finished container (Fig. 6) is allowed to cool after removal from the die. It can be stored quite satisfactorily in its present form provided it is stored in a dry place.

Just before use, the container must be soaked in water for approximately 12 to 24 hours. This will cause the length of the container to expand to about 3 inches. During soaking, the container must be completely

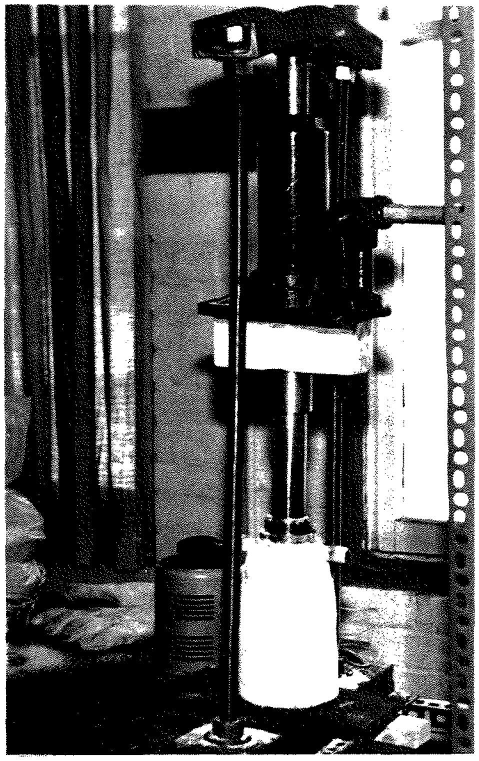

Figure 1. Container pressing equipment.

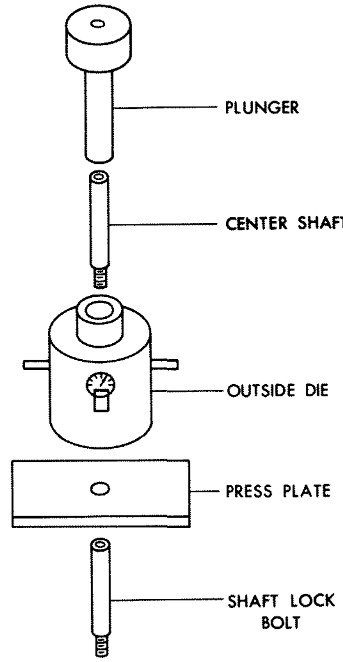

Figure 2. Exploded view of die.

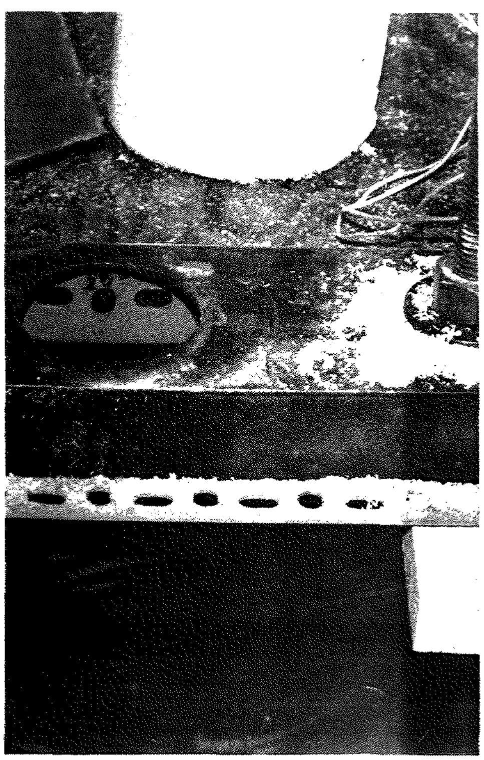

Figure 3. Press hole.

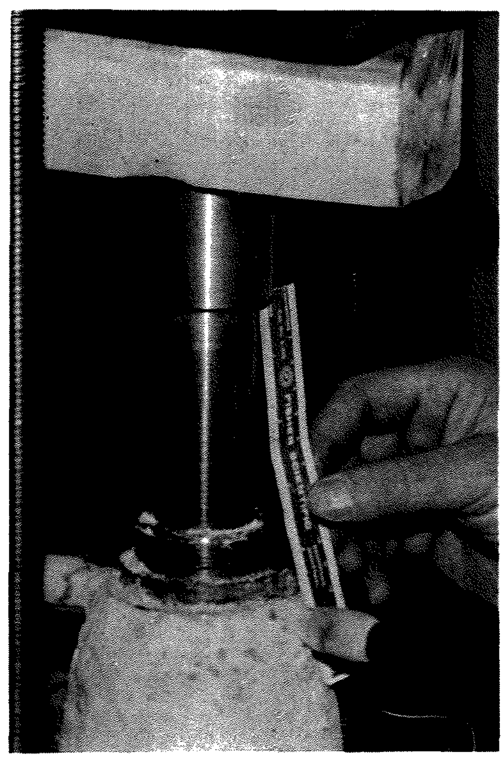

Figure 4. Pressing to stop.

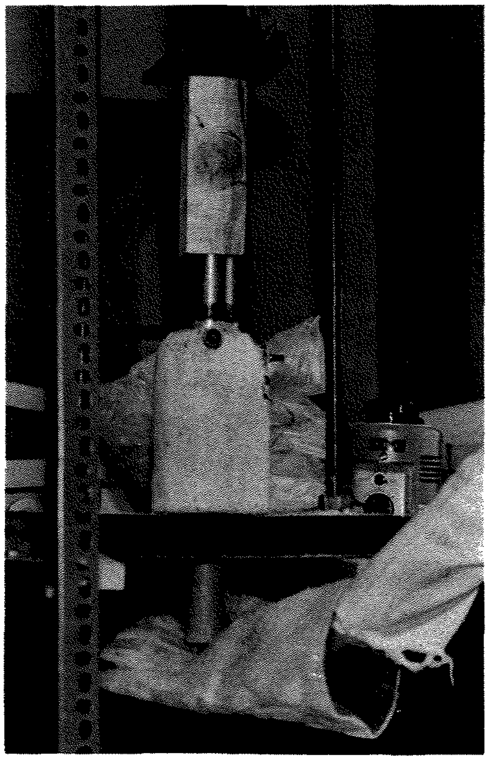

Figure 5. Removing container from die.

Figure 6. Finished container.

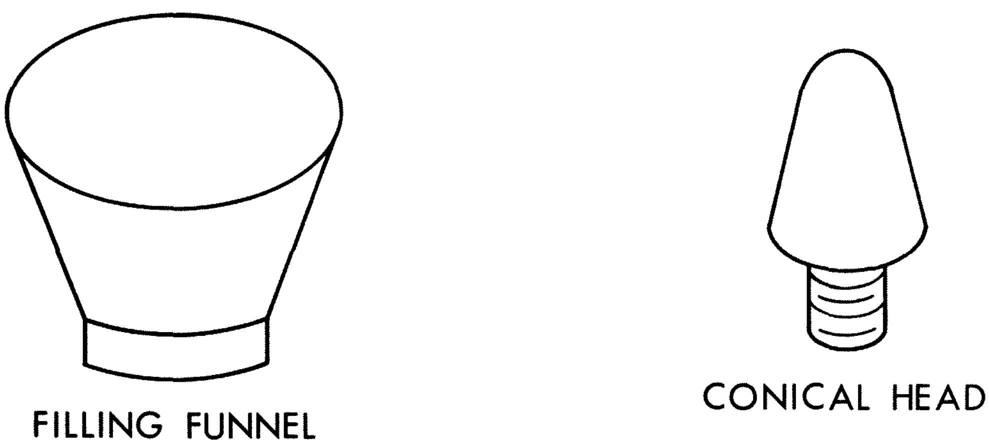

Figure 7. Accessory equipment.