AUTOMATIC MUDDING OF SEEDLING ROOTS

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Introduction

In bundling operations during the past 4 years, the State forest tree nurseries of North Carolina have begun coating seedling roots with clay instead of with sphagnum moss.

This article primarily explains how the clay slurry is handled. However, the list that follows indicates some of the reasons why clay instead of sphagnum moss is used.

1. Sphagnum moss has become more costly each year.
2. Clay, but not moss, can be used in mechanized operations.
3. Clay keeps roots moist longer.
4. Clay requires less maintenance of bundles in storage--no watering.
5. Since using clay, no heating of bundles had been evident at normal outside temperatures during the shipping season--December through March; therefore, the need for expensive refrigeration units is reduced, and less expensive window-type air conditioners can be used.
6. No special racks are needed for drainage of excess water since the bundles cannot be watered unless the clay is washed off.
7. Clay protects the roots during planting.
8. Clay could be used as a carrier for the addition of nutrients if they are determined desirable.
9. Clay provides additional protection from drying out following planting.

The method of handling and applying the clay has greatly improved since publication of earlier articles on the use of clay (Bland 1962; Bland 1964; Davey 1964). Many kinds of clay can be used, but the system described in this report will be useful for all clays.

When the clay slurry was first used, weighed bunches of seedlings (100 to 250 seedlings per bunch) were hand dipped. They were then placed in circular racks for draining and were next put into the bundle as explained by Bland (1962).

Instrumentation and Procedures

The solution does not need to be heated to obtain a proper mixture. With talclike clay, a large tank that can be continually agitated is most desirable (figs. 1, 2).

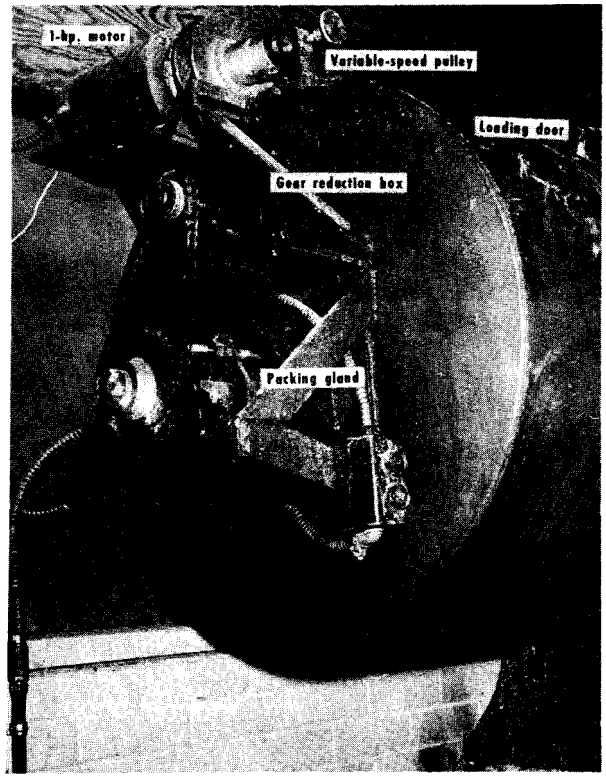

Figure 1.--Clay mixing tank showing agitator drive mechanism.

The mixing tank can be of any size large enough to hold a day's supply. Our tank was

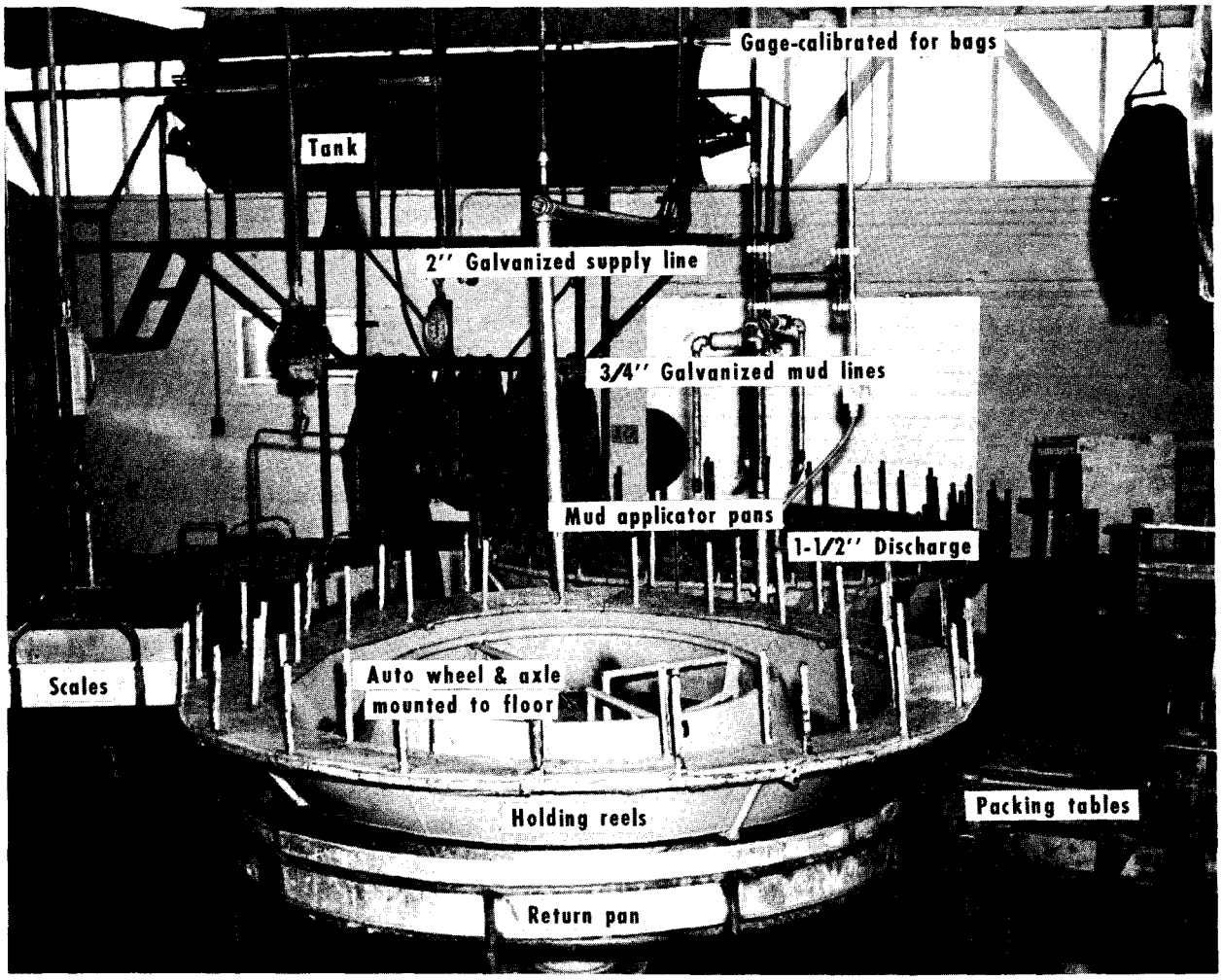

Figure 2.--Layout of packing room showing mixing tank, scales, mud applicators, and packing tables.

designed to mix 1,000 pounds (20 bags) at a time and to keep it agitated with a strap-type auger. The variable-speed pulley and gear reduction box allow a wide range of auger speeds; however, the primary reason for the gear reduction is for power. The initial power is needed when the first few turns of the auger are made following the addition of the 20 bags of clay.

It is important that the clay be added to the water' instead of water to the clay, or the mix will remain lumpy. The clay we use is kiln-dried kaolin in a talc form. This allows the handling of a greater volume of clay with less weight. A mix of 50 pounds of kaolin per 14 gallons of water has been satisfactory.

From the mixing tank, the clay or slurry travels by gravity through a 2-inch galvanizes, pipe to a sump on the packing room floor between the two holding reels. The flow is regulated by a float check valve (fig. 3).

From the sump the slurry is pumped through a Deming end suction, centrifugal pump driven by a 1-hp. waterproof motor into a 1-1/2-inch discharge line. The discharge line is teed over both tables into two 3/4-inch lines, with an adjustable metal pan at the base of each line. The pans can be shaped to achieve the desired shape of clay flow, which depends on the length of roots. With the use of elbows, etc., the 3/4-inch lines are also adjustable. From the holding reels the clay passes into the

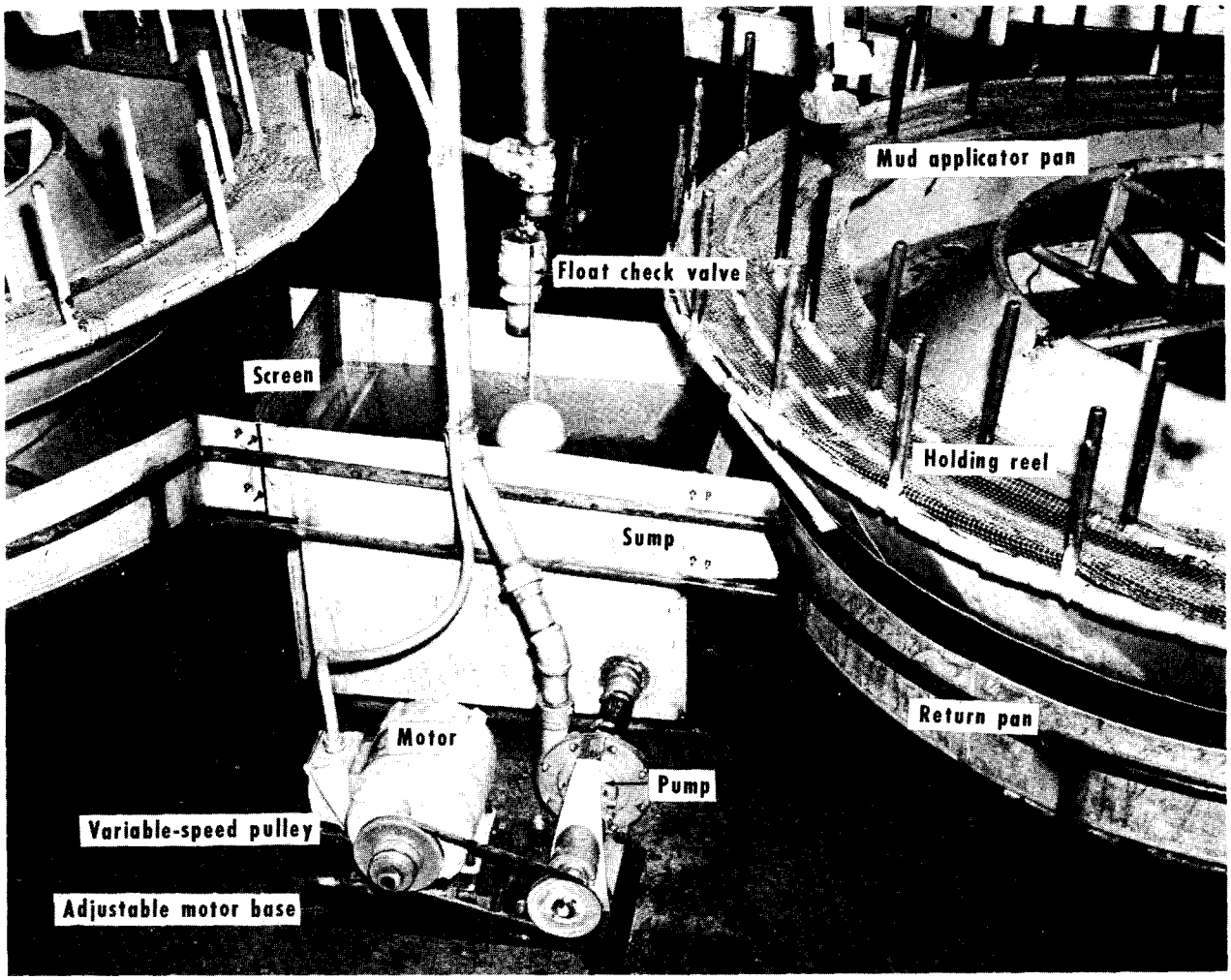

Figure 3.--Clay pumping station showing pump, motor, check valve, and mud applicators.

return pans and back to the pump for recirculation.

Through experimentation, it was determined that nozzles are neither necessary nor desirable. At first it was believed that the small bundles of roots would need a coating of clay from underneath for adequate coverage; however, it was found that volume was more important, and much of the clay coverage occurs when the shipping bundle is made. With sufficient flow of the slurry, more than 95 percent of the roots are covered before entering the bundle; the remainder is well mudded following completion of the bundle.

Results

When we designed this system we were concerned that the clay would dry in the mixing tank and lines; however, as long as the slurry does not receive air the clay will not dry. We have no trouble within the lines. In the mixing tank and sump, the clay settles to the bottom and water goes to the top, so there is no drying out at these locations either. The normal action of the pumped slurry re-mixes the clay. The mixing tank auger runs at all times during the mudding operation, assuring a well-mixed slurry. The mixture left in the

mixing tank from one day to the next is easily returned to its original state.

The most surprising result is that 40 percent less clay is used by the mechanical system as compared to hand dipping, the roots being equally covered. The mechanical system uses 100 to 120 bags of clay per million seedlings, depending on the number of roots, etc. The mixing tank is equipped with a floattype gage, calibrated in bags, which permits the operator to determine how many bags to add, depending on the volume in the tank before additional water is added. The primary reason for this saving in clay is the forced recirculation of the slurry which keeps it at a rather uniform consistency; when hand dipping is used, the clay tends to settle to the bottom and an excessive amount adheres to the lower roots, causing matting within the bundle.

Also, the transfer of the hand-dipped seedlings to the holding reels is quite messy, and much clay is splattered on the floor. There is practically no splattering of clay on the floor with the mechanical method.

Of course, the greatest saving is in labor. Based on an output of 500,000 seedlings per day, this system has eliminated four workers.

Because of the increasing scarcity of moss and labor, and owing to the many advantages of handling clay-treated seedlings, it is believed that many nurseries will adopt the clay method.

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