Cleaning, Pelletizing, and Sowing Eucalyptus Seed

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Eucalyptus seed are irregular in size and shape. The presence of chaff makes seed storage expensive and precision sowing difficult. Methods of cleaning eucalyptus seeds are described, as is pelletizing, a method for making seeds uniform in size and shape, and a simple manual seeder for sowing pelletized seeds. Tree Planters' Notes 40(1):27-30; 1989.

Eucalyptus seedlings are generally grown in containers. Most operations in a container nursery are mechanized, for example, mixing rooting medium, filling containers with rooting medium, and covering seed with gravel. Eucalyptus seeds are irregular in size and about 90% of the weight of uncleaned seeds is chaff. Thus eucalyptus seeds cannot be sown mechanically unless they are cleaned and treated.

Traditionally, unclean seed is sown "by the pinch." With this method each container receives from zero to many seeds. When no seedling develops because no seed is sown or the seed fails to germinate, the expense of cleaning the container, mixing the medium and filling the container, sowing, and covering is lost. If more than one seedling develops in a container, the extra's must be removed, which is costly because of the time and seed wasted.

Once cleaned, eucalyptus seed is still difficult to sow because it is small and irregular in shape. The average number of seeds per ounce for the major species planted in the United States ranges from 25,000 for *Eucalyptus globulus* to 200,000 for *E. camaldulensis* (3). Irregularly shaped seeds must be made uniform in size and shape by pelletizing if sowing is to be mechanized. Once individual seeds can be sown precisely, general equations for predicting number of blank containers, number of excess seedlings to be thinned, and number of plantable seedlings after thinning can be used (4).

The problem of uncleaned, irregularly shaped seed can be partially or wholly avoided by purchasing cleaned or cleaned and pelletized seed. If purchased by weight, cleaned seed is more economical than uncleaned seed because chaff is not shipped or stored. Seed, whether purchased or collected, should be cleaned before storage or other processing. This paper describes methods for cleaning, pelletizing, and sowing eucalyptus seed.

Cleaning

Although eucalyptus seed and chaff are similar in size and weight, enough differences exist to allow a large percentage of the chaff to be removed with sieves and seed blowers (fig. 1). We recommend using U.S. Standard sieves, numbers 18 and 30. Place sieve no. 18 on sieve no. 30 and then place them over a collection pan. Pour seed and chaff onto the top sieve. The larger pieces of chaff will remain on the top sieve while the seed and smaller pieces of chaff fall through to the lower sieve. With some agitation, small seeds and

Figure 1—*Sieves* **(right)** *and blower-cleaner* **(left)** *used to clean eucalyptus seeds.*

pieces of chaff will fall through to the collection pan. Discard the mixture of small seed and chaff in the collection pan because it is time consuming to separate and the seedlings that develop from these seed generally are not as vigorous as seedlings that develop from larger seeds (personal observation for eucalyptus species) (1). What remains on the lower sieve is about 85% pure seed.

Use a blower-type cleaner to separate seed from chaff. The air moving through the seed-cleaner tube transports the lighter chaff higher than the heavier seed. Therefore, seed and chaff collect in different pockets on the inside of the cleaner tube. The air velocity is increased until the seed is blown high enough to begin collecting in the pockets holding the chaff. The color change that occurs in those pockets when the dark brown seeds cover the reddish-brown chaff indicates that the cleaning process is complete. After separation, seed purity should approach 100%. Cleaned seed can be sown more precisely and accurately, but not necessarily more efficiently, than uncleaned seed because the irregular shape and size of the seeds prevent mechanized operations.

Pelletizing

Pelletizing results in uniform seed pellets, each containing one seed (fig. 2) (2). Generally pellets of about 1.5 mm diameter are convenient to prepare, store, and sow.

The materials required for pelletizing seed are an adhesive, silica sand, and a reciprocating-rotating pan. The adhesive is a 5.8% solution of Gelvatol, a cold-water-soluble polyvinyl alcohol resin (58 g dissolved in 942 ml of water). The sand should be Berkeley fine dry silica sand. Sieves are used to obtain sand particles of the right size for "starter" and "outer coating" sand. The starter sand is obtained from the silica particles that pass through a U.S. Standard no. 200 sieve. The outer coating sand is obtained from the particles that pass through a U.S. Standard no. 140 sieve.

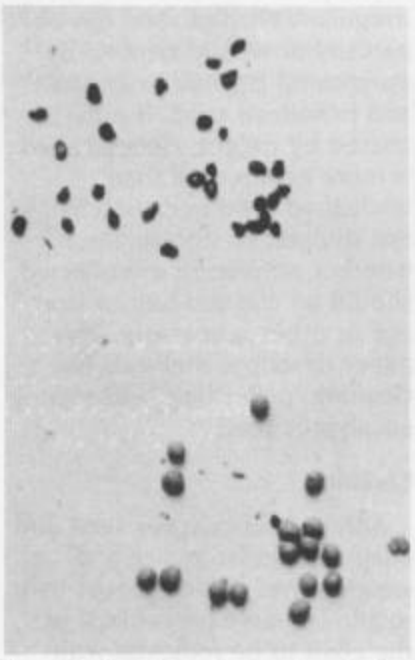

Figure 2—*Unpelletized* **(upper)** *and pelletized* **(lower)** *eucalytpus seed.*

To pelletize, place seed in the pan, which is now in operation (fig. 3) and spray them with adhesive at a constant low pressure, generally 2 to 4 pounds per square inch. Shake starter sand onto the seeds. Pellets will begin to form. Recover any seeds that stick to the side of the pan, wash away the sand, dry the seeds, and return them for recoating. When pellets are about the correct size, shake on the outer sand coating. Screen the wet pellets to size with a shot-hole sieve. Wet pellets can be poured but should not be touched. Return undersized pellets to the pan for additional coating. Dry pellets of the correct dimensions in an oven until they are hard, generally for 1 or 2 hours at 40 °C.

Pelletizing seed makes their size uniform. Accordingly, all the seed of a species or of different species are effectively the same size and can be sowed with the same equipment.

Sowing

Pelletized seeds can be sown by hand but are sown more efficiently with a shutterbox seeder (fig. 4) (5). The seeder will place one seed into each container each time it is operated. It can sow seeds singly or into a number of containers at once. The

Figure 3—*Eucalyptus seed being pelletized in a reciprocating-rotating pan.*

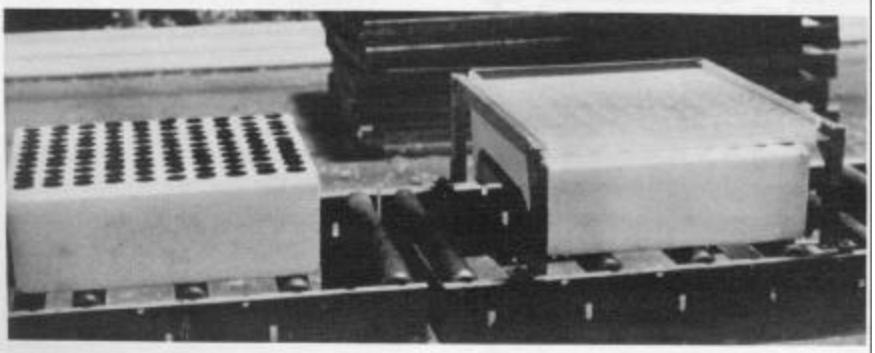

Figure 4—*Manual seeder for sowing pelletized eucalyptus seed into containers.*

seeder consists of a frame that holds 3 Plexiglas® plates above the containers. The top plate is about ½ inch thick, the middle plate is about the same thickness as the diameter of the pelletized seed, and the bottom plate is about ¼ inch thick. The top and bottom plates are held in a fixed position so that their holes do not line up; the middle plate slides between them. The plates have holes in them that are in the same arrangement as the containers to be sown. The holes in the top and bottom plates are about 2.5 times the diameter of the pelletized seeds, while the holes in the middle plate are just slightly larger than the pelletized seeds. The holes in the top plate are countersunk to concentrate the seeds around the holes. The top edges of the holes in the middle plate are beveled to reduce the chance of damaging the seed as the plate is moved back and forth.

For the sowing operation, place seeds in the holes of the top plate (fig. 5A). The middle plate slides so that its holes line up with the holes in the top plate. When the holes in the two plates are aligned, seeds fall into the holes in the middle plate (fig. 5B). As the middle plate slides in the opposite direction and its holes are aligned with the holes in the bottom plate, seeds fall through to the containers (fig. 5C). A sowing cycle of placing containers under the

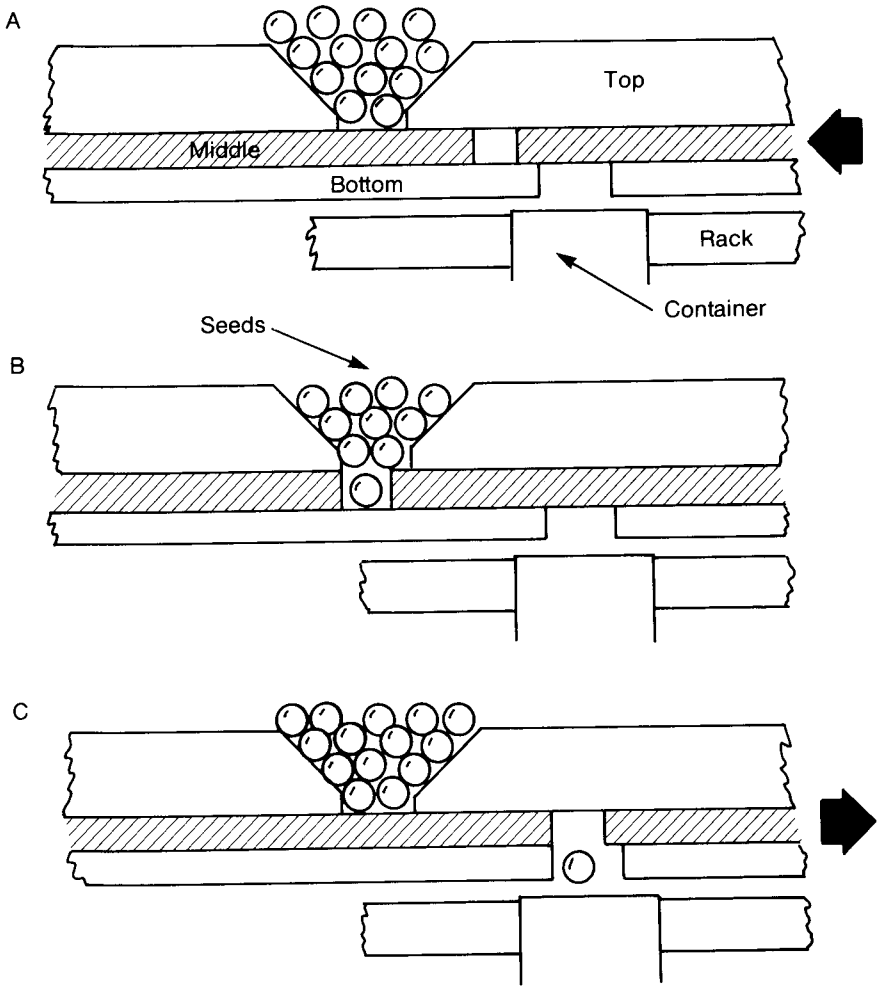

Figure 5—*Schematic of the operation of the manual seeder: holes in the top plate are filled with seeds* (**A**)*; middle plate is moved so that the holes are aligned with holes in the top plate, and seeds drop into the holes* (**B**)*; middle plate is moved so that the holes in it line up with the holes in the bottom plate, and the seeds fall into the containers* (**C**).

seeder, moving the middle plate back and forth (sowing the seeds), and removing the containers requires about 15 seconds. If more than one seed is required in each container, the middle plate is moved back and forth as many times as needed to sow the correct number of seed.

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