

## Fungus-Damaged Seeds Can Be Removed From Slash Pine Seedlots

R. P. Karrfalt

Seed Processing Specialist, USDA Forest Service,  
National Tree Seed Laboratory, Macon, Ga.

The specific gravity table was useful in removing fungus-damaged seeds from slash pine (*Pinus elliottii*) seedlots. This separation of fungus-damaged seeds improved germination in most, but not all, lots.

A recent report (1) indicates that internal seed fungi are commonly found in slash pine seeds from seed orchards. Often, these are pathogenic fungi, which are known to cause losses of flowers, cones, and seeds in seed orchards (3). Damping-off in the nursery is caused by some of these fungi, but it is not yet proven that this problem can be brought on by using infected seeds (2). However, reducing the number of infected seeds in a seedlot is a logical precaution.

Unsound seeds with internal fungi, like those shown in figure 1, are easily identified in a radiograph. Some sound seeds also contain internal fungi. However, current procedures permit removal only of the unsound seeds. Separations are possible only when there is a weight difference between sound and unsound seeds.

### Separation Procedures

**Advance preparations.** Unsound seed with internal fungi are removed as a final step in seed processing. Before this step, all the trash and most empty seeds need to be removed. The seeds should also be sized with round-hole screens. Siz-

ing is necessary because larger, partly deteriorated seeds might well have the same weight as smaller, sound seeds (fig. 2). Wing stubs must also be completely removed because they can adversely influence the physical properties of the seeds during the subsequent removal of seeds with internal fungi.

**Steps to remove fungus-damaged seeds.** The first step is to X-ray the seedlot to allow estimation of the percentage of seeds to be removed. This percentage, on a volume basis, should equal the percentage of seeds in the radiograph that look like the seeds in figure 1.

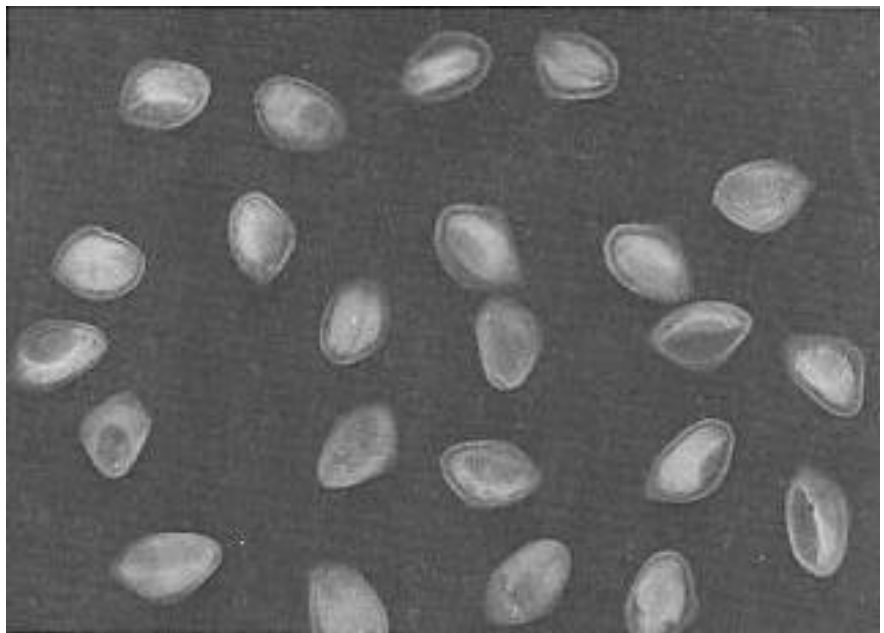


Figure 1.—X-ray of fungus-damaged seeds.

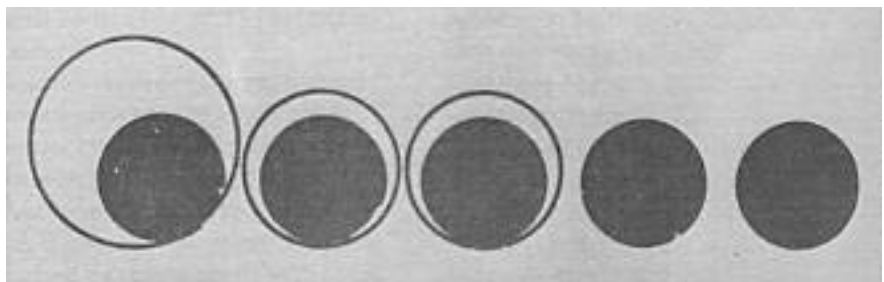


Figure 2.—Seeds with different outside diameters can have the same weight if the larger ones are only partially filled.

A gravity table separation should then be used to remove the fungus-damaged fraction of the seed. Detailed descriptions of the principles of gravity table use are available from equipment vendors or the author. Basically, a blast of cold air and a vibrating wire or cloth table causes seeds to separate according to their relative weights or specific gravity. As a result, heavy seeds move to the top of the table and lighter seeds to the bottom. Careful adjustment is necessary for successful seed separation. For the purpose under discussion, good and bad seeds are separated by adjustable cut off chutes as they leave the table. Radiographs are taken again to verify that the gravity table is properly adjusted. If not, the procedure is repeated and a correction is made.

### Specific Examples

The National Tree Seed Laboratory has assisted two agencies in removing fungus-damaged seeds from slash pine seedlots. The seedlots are, therefore, referred to as group I and group II.

**Group I.** Laboratory germination improved an average of 8 percent for 37 lots, decreased an average of 5 percent in 14 lots, and remained the same for 4 lots (table 1). The largest individual lot improvement was 19 percent. The original germination tests were conducted in October 1979. The first gravity table cleaning was conducted in July

1980. Twenty lots were not satisfactorily improved in the first cleaning and were cleaned again in January 1981.

**Group II.** Group II was composed of two low-quality lots, with germination percentages of 50 and 60 percent. The gravity table separation procedure failed to make an obvious improvement in these lots. However, the fraction with large seeds from one lot was examined more closely. This fraction was given two treatments on the gravity table. The result was a substantial difference in viability between the best and poorest fractions (table 2). Although the general quality of the seed lot was low, the highest quality seeds could still be separated from the poorest seeds.

### Discussion

Fungus-damaged seeds can be removed from many slash pine seedlots by use of a specific gravity table. However, each lot must be treated as a unique problem. Careful adjustment of machine settings, guided by X-ray test results, is required. Some lots will be in such poor condition that a good final product will be impossible.

The decrease in germination of some group I lots after cleaning is paradoxical. This decrease probably was the result of continued seed deterioration between cleanings.

Other types of precision seed separators have not been tested on this problem. These include aspirators and electrostatic

**Table 1.—Group I results from specific gravity table separations**

Lot types <sup>1</sup>	No. of lots	Average germination percentage		
		Before upgrading	After upgrading	Increase/decrease
I	37	73	81	8
II	14	77	7	-5
III	4	81	81	0

<sup>1</sup>Type I lots increased in germination after attempting upgrading. Type II lots decreased in germination after attempting upgrading. Type III lots showed no change in germination after attempting upgrading.

**Table 2.—Group II results from specific gravity table separations**

Lot fraction <sup>1</sup>	How obtained	Germination
1	Top of table, 2d run	61
2	Middle of table, 2d run	61
3	Bottom of table, 2d run	43
4	Bottom of table, 1st run	48

<sup>1</sup>"Fraction" denotes that portion of the seedlot leaving the separator from the top, middle, or bottom part of the table.