

## Cutting Stratified Seed of Western White Pine (*Pinus monticola* Dougl. ex D. Don) To Determine Viability or To Increase Germination

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Ungerminated, but viable, stratified western white pine (*Pinus monticola* Dougl. ex D. Don) seed will germinate after the side of the seed is cut, exposing the gametophytic tissue. Germination of stratified but uncut seed from several trees averaged 21 percent, ranging from 10 to 30 percent. Germination of stratified and cut seed from the same trees averaged 80 percent, ranging from 20 to 93 percent. Tree Planters' Notes 37(1):25-26; 1986

Germination of western white pine seeds is often slow and erratic, even after the recommended stratification procedures (90 to 100 days, with constant moisture at 3 °C) are followed (2). Consequently, one is left wondering if the seed was viable, or if something went wrong with the stratification treatment.

In some of our earlier work, we have induced germination of seed that had been stratified and sown by cutting a small sliver from one side of the seed. Poor germination of a recent test made it necessary to cut seed to improve germination. The purpose of this note is to share this procedure with others.

The seed is cut along one side of the seed to remove a small sliver of the seed coat, membrane, and gametophytic tissue (fig. 1). One-sixteenth of an inch can be cut carefully from the radicle end of

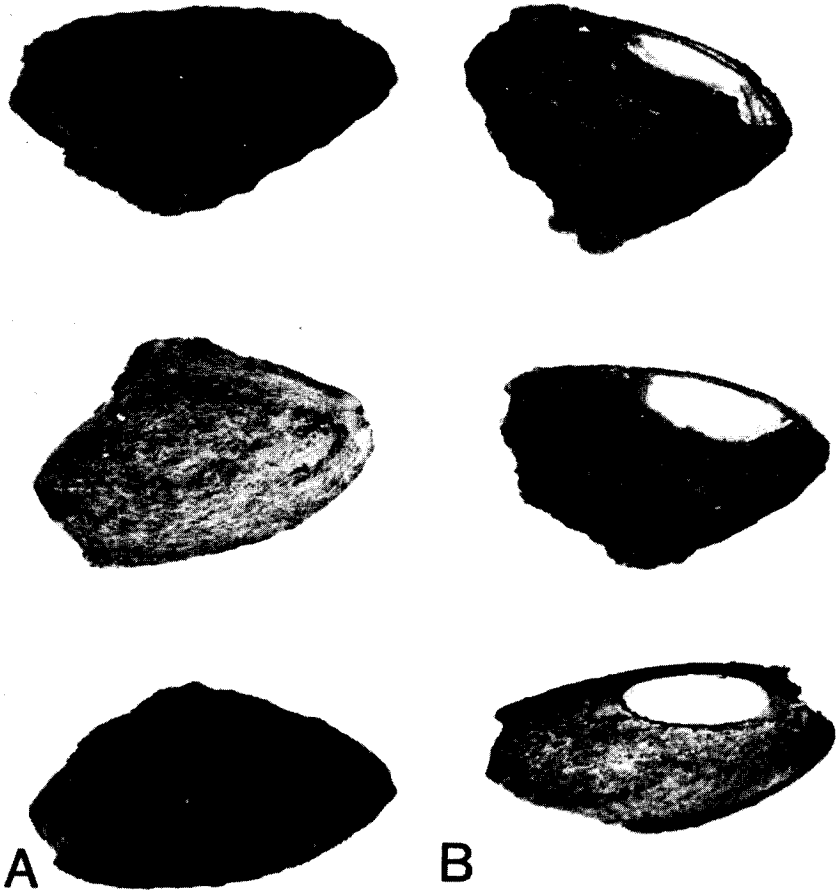


Figure 1A—Intact seed. B—Seed cut on side; notice that cut is made into gametophyte tissue.

the seed. A cut at the opposite end results in abnormal germination; namely, the cotyledons emerge through the cut end. Also, the cut must pierce the membrane between the seed coat and gametophytic tissue, or germination will not occur. The membrane, which consists of the inner layer of cells of the integument, appears to be the critical structure restricting or pre-

venting germination for this type of dormancy.

One hundred and seventy-five seed from 35 seed lots were sown on May 2 in 10-cubic-inch containers. The seed had been given 45 days of cold-wet stratification. (1). After 28 days of incubation in a warm (70 °F) greenhouse, only 31 percent of the seed germinated (table 1). Therefore, we dug up an

**Table 1**—Germination of intact and cut seed of western white pine in 35 seed lots

	Germination	
	No.	%
Intact seed (6125 seed sown, 175/lot)		
28 days of incubation	1,928	31
49 days of incubation	2,107	43 <sup>a</sup>
Cut seed (37/lot) <sup>b</sup>		
21 days of incubation	906	71

<sup>a</sup>Total seed adjusted by seed cut, i.e., 6125 - 1270 = 4855.

<sup>b</sup>Intact seed were cut 23, 24, and 25 days after incubation.

average of 37 seed per lot, cut the seed on the side as indicated in figure 1, and replanted them in the same container. After 21 days of incubation, average germination of the cut seed was 71 percent. Meanwhile, 179 intact seed germinated, which equaled 43 percent after adjusting total seed for number of seed cut. Some seed lots responded more than others. For example, 90 percent of the seed of one seed lot germinated after cutting, compared to only 1 percent when intact.

With the cutting procedure, one can readily determine viability and

germinability of stratified seed, and can thus assign the cause of nongermination either to poor quality seed or to the failure of the stratification procedure to overcome seed dormancy factors. The number of germinates from some small seedlots from which a minimum number of seedlings is required can be increased with this procedure. Because the procedure is so labor-intensive, it would probably not be economical for large-scale use, but a mechanical device might be developed to accomplish the task.

**Literature Cited**

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