FRASER FIR SEED COLLECTION, STRATIFICATION, AND GERMINATION

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Interest in growing Fraser fir, Abies fraseri (Pursh.) Poir., has rapidly intensified since the United States Forest Service began annual Christmas tree sales from Roan Mountain, North Carolina, several years ago. The ready sale of this species to buyers from a radius of several hundred miles stimulated residents of the surrounding area to form a Christmas tree association and to establish fir plantations.

To supply the need for planting stock, the North Carolina Forest Service collected seed and began growing seedlings for distribution. The Holmes State Forest Nursery devoted its entire facilities to the production of Fraser fir stock; the Edwards State Forest Nursery is growing fir on an experimental basis only. Because the demand for seedlings has increased, several commercial nurseries in the East have also started growing Fraser fir and now offer it for sale.

This increase in production and use of Fraser fir for Christmas trees as well as for ornamental purposes is cause for studying methods of seed collection, stratification, and germination in order to obtain maximum utilization and productivity. The uncertain seed years, extremely limited collection areas available, and difficulty of collecting cones from the very tops of the trees all tend to make maximum use of the seed crop necessary. In the trade, Fraser fir demands the top price of all fir seed, yet less is known about its handling than of any other fir species in this country.[1]

A bumper crop of cones was produced in 1960 and test collections commenced on August 31. The seed coat at that time was white with a little purplish shading toward the wing, which was all purple. Additional collections were made on September.6 and again on September 23; by that time many of the cones showed the first signs of disintegration. From 900 to 1,200 cones were contained in each bushel.

Following collection, all cones were air-dried for several weeks. The seed was then separated from the cone bracts and axils by hand screening through one-quarter inch galvanized wire cloth. The seed was air-dried to about a 10-percent moisture content prior to storage at room temperature in polyethylene bags. From 2.1 to 2.7 pounds of cleaned seed were secured from each bushel of cones; each pound contained between 50 and 60 thousand seeds.

The various seed lots were tested by the Eastern Tree Seed Laboratory, U. S. Forest Service, Macon, Ga., in the early part of December. Most lots of unstratified seed were tested at both alternating and constant temperatures. Because germination data were similar for both alternating and constant temperatures, the)results have been combined. All lots of seed were stratified for 60 days at 38^0 F., in peat moss (table 1). Samples from lot 5 were also stratified for 30, 60, and 90 days, and germination was 58, 56, and 68 percent, respectively.

The data show that the timing of cone collection was of considerable importance in regard to the number of seeds which germinated. Germination of seed collected on August 31 when the seed coat was white with a little purplish shading toward the wing, was 18

1 U. S. Forest Service. Woody-plant seed manual. U. S. Dept. Agr. Misc. Pub. 654, 416 pp., illus. 1948.

TABLE 1.--Cumulative germination percent[1] of Fraser fir seed from cones collected in North Carolina on three days in 1960

Stratification and length of germination test (days)	Cones collected--					
	August 31, seed lot 1	September 6			September 23	
		Seed lot 2	Seed lot 3	Seed lot 4	Seed lot 5	Seed lot 6
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Unstratified:[2]						
11	0	0	22	4	9	--
15	2	10	35	11	32	--
19	5	16	41	15	44	--
23	7	18	41	16	46	--
27	9	19	42	17	50	--
31	13	21	43	17	53	--
35	16	22	44	18	56	--
Stratified:[3]						
11	2	18	34	24	33	33
15	6	22	40	29	48	55
19	10	24	41	30	54	62
23	12	25	42	31	55	64
27	15	26	42	32	56	65
31	18	26	42	32	56	66

[1] Based on six subsamples of 100 seeds for each determination.
[2] Data for unstratified seed tested at constant and alternating temperatures combined.
[3] Stratified for 60 days in peat moss at 38° F.

percent. Germination increased to as high as 66 percent when collections were delayed until the seed coat colored and cone disintegration began about September 23. There may be considerable variation in germination of seed collected on the same date as is shown by the collections on September 6 which varied from 18 to 44 percent for unstratified seed and from 26 to 42 percent for stratified seed. In spite of this broad range of germination on a single collection date, there appears to be a definite correlation in germination ability associated with the length of the seed maturation period. The data also show that the necessity of stratification of Fraser fir seed was highly questionable. Stratification increased the speed of germination but did not affect the amount in four out of five seed lots.