GERMINATION OF PAULOWNIA SEEDS AFTER STRATIFICATION AND DRY STORAGE[1]

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Paulownia seeds stored in stratification and dry storage at 4° C had high germination after 3 years, but speed of germination declined rapidly after 4 months. Stratification is recommended over dry storage.

Paulownia (*Paulownia tomentosa*), a native of China, may prove satisfactory for the reclamation of surface mines and provide a valuable timber resource for the eastern United States (*3*). The wood of Paulownia is highly prized by buyers from Japan and has been actively sought in Kentucky. The wood has been used in eastern Asia since ancient times for small articles, such as rice pots, bowls, wooden spoons, and lacquered boxes, as well as furniture. In the Southeast, Paulownia seems to be especially well adapted to the harsh microclimates of surface mines. Several mines in the vicinity of Middlesboro, Ky., are covered with seedlings of this species. It grows very rapidly on surface-mined sites and seems to be drought resistant.

Paulownia is a heavy seed producer and young trees begin to produce seed after 8 or 10 years. There are about 6,000 seeds to one gram (fig. 1) and under favorable conditions a large tree may produce as many as 20 million seeds in a year. In Kentucky, the best time for collecting seeds is September. The pods should be gathered after ripening but prior to opening, and allowed to air dry.

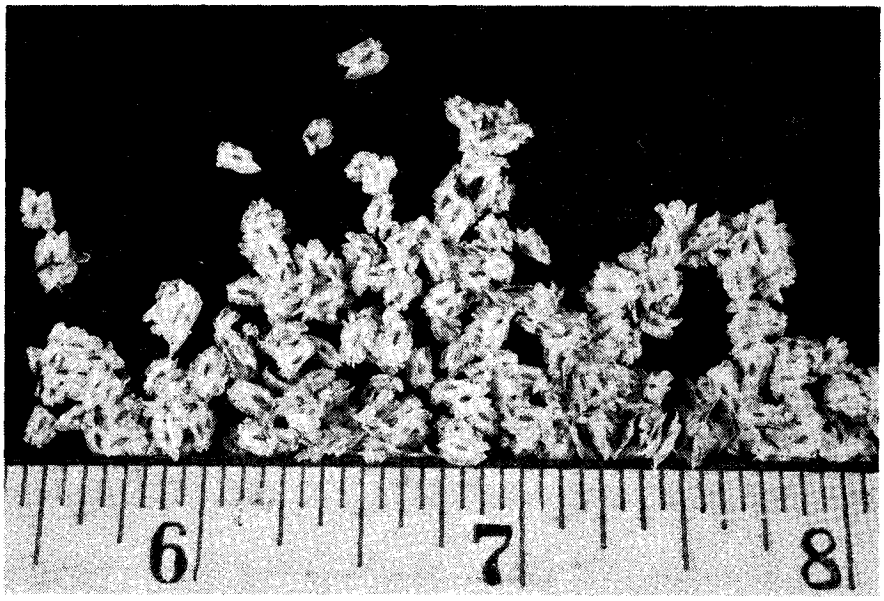

Figure 1.—*Paulownia seeds are small and winged. There are approximately 6,000 seeds to one gram. These are transported great distances from a seed tree to other locations by wind currents.*

We have found that a good way to remove seeds from pods is to place the pods in burlap bags and crush them. Then a seed blower can be used to separate the seeds from the heavier trash.

Methods

Seeds were collected in the fall of 1974 from a single tree growing in the vicinity of Wolf Creek Dam on Lake Cumberland in south-central Kentucky. Separate lots of seed were stratified in a 1:1 mixture of peat moss and sand, or stored dry in 285-ml sealed glass containers. Both treatments were placed in a cold room that was maintained at 4° C. During the next 36-month period, test samples were removed at periodic intervals to determine the effect of the storage method and length of storage period on the percent germination and germination value.

Seeds were germinated under continuous light in covered glass petri dishes on a layer of Whatman No. 1 filter paper, four-sheets thick, and moistened with distilled water. On each test date, seeds were removed from both the stratified and dry storage treat-

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ments. A single treatment test consisted of 10 petri dishes containing 25 seeds for a total of 250. Temperature during the germination period was maintained at approximately 20° C. Seeds were illuminated with a cool white fluorescent light source at 1.5 x 10^4 lux Germination was recorded daily and, for our experiments, was defined as emergence of the radicle. Treatments and dates were compared by computing percent germination and germination value (*4*).

Table 1.—*Effect of length of storage period on the germination of Paulownia seeds stratified and stored dry at 4° C*

Storage period	Number of seeds germinated	Mean daily germination	Peak value	Germination value	Percent germination
Months		*Stratified*[1]			
2	242	5.69	9.28	52.80	96.8
4	246	9.84	21.90	215.50	98.4
18	235	7.23	10.13	73.25	94.0
27	244	4.87	6.80	33.12	97.6
36	-[2]	-	-	-	-
		Dry storage			
2	170	2.58	2.78	7.17	85.0
4	237	5.93	10.05	59.55	94.8
18	214	4.28	6.63	28.38	85.6
27	241	3.57	4.84	17.28	96.4
36	234	4.07	5.71	23.24	93.6

[1] Seeds stratified in a 1:1 mixture of peat moss and sand.
[2] No data taken.

Results and Discussion

Table 1 summarizes the germination data for stratified and dry stored seed tested at periodic intervals for a 36-month period. Our results show that Paulownia seeds can survive relatively long periods of stratification and dry storage at 4° C with little loss of viability. However, germination was somewhat erratic for seeds stored dry. After 4 months, dry seeds attained a germination percentage of 95, but after 18 months this dropped to 86 percent. After 27 months, this value had increased to 96 percent. Upon careful examination of our sampling methods it was determined that the low 18-month percent germination may have occurred due to differences in the method of selecting test seeds. On this date, sample seeds were drawn from the top of the sample container from a layer in direct contact with air. On the other dates, seeds from the top, middle, and bottom of the sample container were mixed.

Although our results indicate that percent germination remains high, our data on germination values indicate that speed of germination of Paulownia seeds declines rapidly in storage. For stratified seeds a maximum germination value of 215.50 was reached in only 4 months and rapidly declined to 33.12 at the 27-month sampling date. The results for seeds stored dry show a similar pattern but germination values were lower and more erratic.

The increase in germination value between the 2- and 4-month sampling dates is interesting and may reflect the effect of low temperature on the light requirement of Paulownia seeds. From other tests we have determined that stratified seeds germinate more quickly than unstratified ones. Similar results have been reported previously (*1, 2*).

Conclusions

Our results indicate that Paulownia seeds can be stored for a relatively long period of time at 4° C without significantly reducing germination. Stratification is recommended over dry storage because higher germination values are achieved. However, regardless of method of storage, germination values can be expected to decline after a brief period.

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