Sweetgum Seed Quality and Seedling Height as Related to Collection Date

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Viability of most tree seed is highest at the time of dispersal. In practice, collections normally precede dispersal either to increase efficiency or insure seed of known parentage.

The study reported here was made to determine the effect of collection data on germinability of sweetgum seed and on seedling height growth in the nursery. A secondary objective was to learn if specific gravity of the seed head is an indicator of seed maturity.

METHODS

Collections were made from six trees in Harrison County, Mississippi, at 2-week interval from September 5 to November 28, 1962. By the latter date, some heads were open and beginning to disperse seed. All trees were in different stands, therefore probably not closely related.

On each date a sample of 20 seed heads were collected from each tree. The heads were placed in sealed containers, and immediately taken to the laboratory. Five representative heads from each sample were weighed to the nearest 0.01 gram. Volume of each head was determined by water displacement to the nearest 0.5 milliliter.

The entire sample from each tree was air-dried in the laboratory until the heads opened. The seeds were extracted, cleaned, counted, and stored for 4 weeks at 5° C and 12 percent relative humidity. Following storage (which permitted moisture contents to come to equilibrium) all samples were weighed to the nearest 0.001 gram.

Following 30 days' stratification, 100 seeds from each sample were sown on filter paper in petri dishes. Germination was recorded daily. Total germination was computed as a percentage of sound seed, and number of days for each sample to attain 90 percent of total germination was calculated.

In the spring of 1963, 37 stratified seeds per sample were sown in each of four replications of a split-plot test in the nursery. The main plots consisted of seed from individual trees, the subplots represented collection dates. The number of emerged seedlings was recorded 3 weeks after sowing. At the end of the growing season the heights of the five tallest plants in each 4-foot row were measured to the nearest centimeter.

RESULTS

Specific gravity of the seed heads decreased markedly between the first and second collection dates (fig. 1). Although subsequent fluctuations varied significantly, the value at the final collection date, when natural dispersal had begun, was not significantly different from that on October 3. In contrast to the data reported for the southern pines (McLemore 1959; Wakeley 1954), sweetgum seed heads will open naturally when collected prior to seed maturity.

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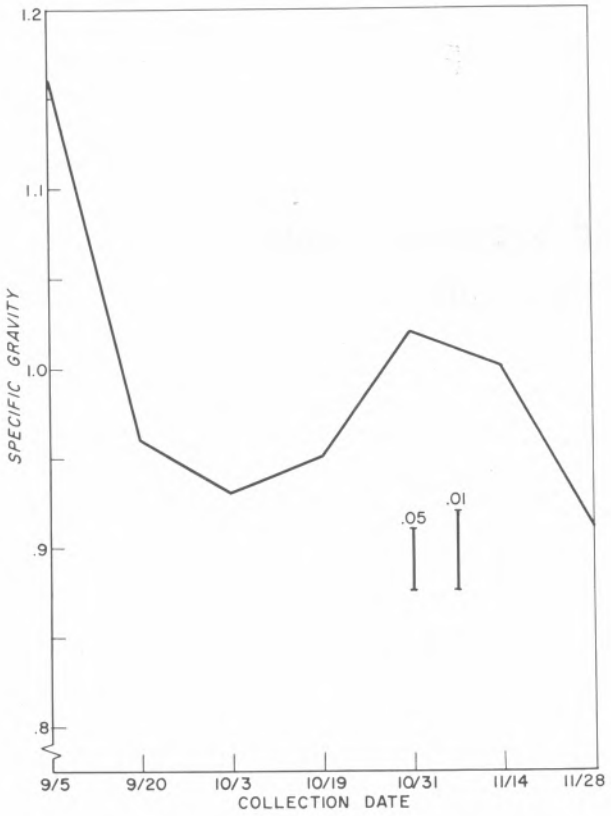

Figure 1 -- Specific gravity of sweetgum seed heads. Vertical lines indicate the minimum range of mean values for significance at the 0.05 and 0.01 levels according to Duncan's test (1955).

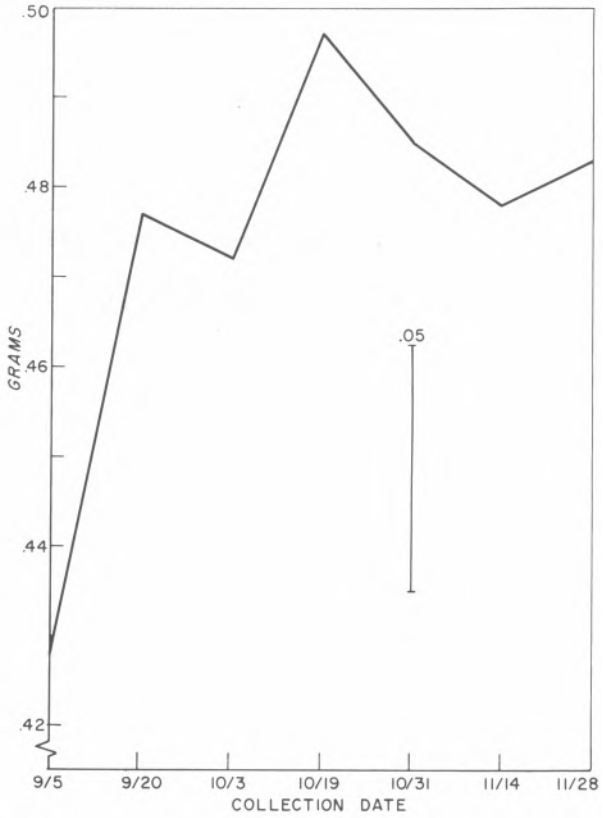

Figure 2 -- Weight per 100 sweetgum seeds.

test (1955).

Seed weight and rate of germination were related to time of collection. Weight per hundred seeds (fig. 2) was significantly less on the first collection date than subsequently, but did not differ significantly among collections after September 5. The marked increase in weight between the first and second collections suggests that the seed was not fully developed until mid-September.

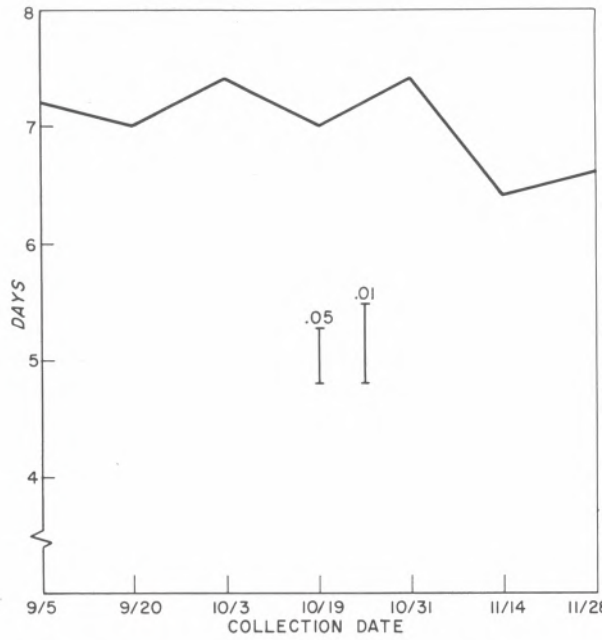

Figure 3 -- Time required to attain 90 percent of total germination.

The number of days required to attain 90 percent germination (fig. 3) was about constant until November, when it decreased slightly--indicating an increase in rate of germination. The increase was so small and came so late that for practical purposes it would be overbalanced by seed losses through dispersal.

Total germination did not differ significantly among collection dates. In several coniferous species, by comparison, a progressive increase in germination was associated with decreases in cone specific gravity (Eliason and Hill 1954; Maki 1940; McLemore 1959).

In the nursery, neither the proportion of emerged seedlings nor the seedling heights differed significantly among collection dates. The percent of emerged seedlings was consistently about half the total laboratory germination. Mean heights

anged from 72 to 75 centimeters and showed no consistent change with collection date.

The Woody Plant Seed Manual (1948) reports that sweetgum seed heads turn yellow between September and November as the seed matures. In this study it was not possible to distinguish any color change that could be used as an index of either seed maturity or time of dispersal.

Specific gravity of the head appeared to be a good indication of seed weight. This same relationship between specific gravity and seed weight has been reported in ponderosa pine (Maki 1940).

In conclusion, seed weight and rate of germination differed among lots collected from mid-September until late November, but establishment and growth in the nursery were not affected. Apparently, in south Mississippi sweetgum seed can be collected safely over a 6-to 8-week period beginning around October 1. The changes in weight and rate of germination suggest that, if comparisons are to be made for these characters among seed lots, collections should be as near simultaneous as possible.

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