

MATURITY OF MAPLE AND ASH SEED

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Seed of boxelder maple (*Acer negundo* L.) and green ash (*Fraxinus pennsylvanica* Marsh) ripen in the fall. These seeds gradually change color from green to yellow or brown with maturity. However, seed collectors and nursery operators require a reliable measure of maturity for harvesting of seed from standing trees. Several studies have reported on the maturity of sugar maple seed (1, 2, 3), which was found to have a moisture content of 55 percent at time of natural seed fall (2). This article reports on exploratory study using moisture content of the seed to measure maturity and identify the time of seed collection for fall nursery sowings in the Plains region. Subsequent studies on storage and viability of maple and ash seed will be reported in the future.

Materials and Methods

Samples of 3,000 seeds were collected in 1956 from four mature trees of both boxelder maple and green ash at the Indian Head Tree Nursery. Seeds were harvested at three 21-day intervals, namely, on August 22, September 12, and October 3. These bulk samples were spread out on trays in the greenhouse to dry for 1 week, then were placed in cheesecloth bags and stored. Half of the seed from each tree and harvest date was stored in a heated room and the other half in a cool cellar, until sown in seedbeds on October 16.

Maple and ash seed for fall sowings should not be harvested until the average moisture content falls to 57 and 49 percent respectively.

Viability of the seed was estimated by cutting tests involving three samples of 100 seeds from each tree at each harvest date. These seeds were visually classified as sound, damaged (by insects or disease), or abnormal (small or empty due to an abortive embryo). All seed in the bulk samples, which appeared damaged or abnormal, were discarded prior to tests for moisture, storage, and germination.

Moisture content for three samples of 50 seeds from each tree was determined, at each time of harvest and before sowing, from the loss of weight when oven-dried at 100° C for 24 hours. Then the percentage moisture on a fresh weight basis was calculated.

Germination capacity of the seed was determined in the spring of 1957 from seedbed sowings on October 16, 1956. Separate sowings were made for room and cellar storages of each species in a split plot design having five replications, with main plots of trees and subplots of 100 seeds for each harvest date. A Captan fungicidal drench (24 g/100 ft²) was applied to the seedbeds before and after sowings to control damping off diseases. Unfortunately, these sowings were not irrigated and only half an inch of rainfall was recorded prior to the first snowfall (0.7 in.) on October 25. Emergence and germination were recorded weekly from April 8 to July 4 in 1957. Only those seedlings

that after emergence had shed seedcoats and opened cotyledons were reported for germination capacity as a percentage of the seed sown.

Results

Moisture content of maple seed on the three dates of harvest and after storage for the four trees has been summarized in table 1, with corresponding seed viability data from the cutting tests and seedbed germination. Moisture content of the seed from all four trees was significantly less for each subsequent harvest. Average moisture content of maple seed was 67 percent on August 22, but had fallen to 57 percent by September 12 and to 10.8 percent by October 3rd. Corresponding color of the seed was all green, greenish-yellow, and all brown, respectively, for the three dates of harvest. Moisture content of seed after room storage at 71° to 80° F was low and similar for all dates of harvest varying only from 6 to 8 percent. Moisture of seed after cellar storage at 40° to 56° F was generally higher, but was significantly less for the last date of harvest (9 percent) than for the two earlier dates (16 percent).

Viability of maple seed, when estimated on the basis of visually sound seed from cutting tests at time of harvest, was similar and averaged 79 percent for all three dates of harvest. However, the quantity of sound seed appeared to vary from 51 to 59 percent for

one tree (M-4) and that of the other three trees from 80 to 89 percent.

Maple seed viability, when determined by seedbed germination capacity, varied greatly (10 to 60 percent) for harvest dates, storages, and trees. However, the average germination was significantly less for the first date of seed harvest. Germination of seed collected on August 22 was only 28 to 30 percent following cellar and room storage, but increased to 40 percent for the later harvests and both storages.

Germination capacity of seed, which was harvested from two trees (M-1 and M-3) on August 22 was significantly less than that harvested 21 and 42 days later when stored in the cellar. Similar trends were manifested following room storage. In addition, mean germination of seed from one tree (M-4) was significantly less than from the other three trees, being only 12 percent following room storage and 24 percent for cellar storage. However, seedbed germination of the more mature seed from the M-4 tree was significantly less following cellar storage, which suggested an increase in seed dormancy with maturing and inadequate natural stratification.

Moisture content of green ash seed from four trees on the dates of harvest and after storages is summarized in table 2, with corresponding seed viability data.

Table 1.—Moisture content and sound cutting estimate of boxelder maple seed harvested from four trees at three 21-day intervals in 1956 with seedbed germination in 1957 following room and cellar storage until sown

Seed-trees	Dates of harvest	At harvest	Moisture Content ¹		Sound ² cutting estimate	Seedbed ³ Germination	
			Room	Cellar		Room	Cellar
----- percent -----							
M - 1	Aug. 22	67.1	7	16	84	41.8	13.0**
	Sept. 12	61.1*	7	16	89	46.6	60.4
	Oct. 3	10.3*	8	10	80	50.0	42.9
M - 2	Aug. 22	62.8	7	16	88	43.6	35.2
	Sept. 12	46.9*	7	15	87	39.8**	39.2**
	Oct. 3	10.8*	8	9	86	55.0	46.8
M - 3	Aug. 22	70.8	7	17	87	25.8**	22.8**
	Sept. 12	61.9*	7	16	85	54.0	48.2
	Oct. 3	11.4*	7	9	84	43.0	47.8
M - 4	Aug. 22	67.6	6	15	59	9.8	44.2
	Sept. 12	58.4*	7	16	55	14.8	16.6*
	Oct. 3-	10.8*	8	9	51	12.0	12.2*
Means	Aug. 22	67.2	7	16	79	30.2**	28.8**
	Sept. 12	57.1*	7	16	79	38.8	41.1
	Oct. 3	10.8*	8	9	75	40.0	40.5

¹Percentage moisture of seeds for 3 samples of 50 after drying at 100° C.

²Percentage of sound seed estimated from 3 samples of 100 by cutting tests.

³Percentage germination capacity for 5 replications of 100 seed sown.

*Significantly less than for previous date of harvest.

**Significantly less than for later date of harvest.

Moisture content of ash seed was significantly less for each subsequent harvest of three trees, but only for the last date of harvest of one tree (A-1). Average moisture was 52 percent on August 22, 49 percent on September 12, and 13 percent on October 3. However, the color of seeds varied from green to greenish-yellow for the first two dates of harvest, although all

seed were more or less yellow on the last date of harvest for all trees.

Seed viability, when estimated from seed cutting tests, demonstrated that the percentage of sound seed was almost identical for all three dates of harvest of each tree. However, sound seed ranged from 82 to 85 percent for one tree (A-2) and from 87 to 95 percent for the other three trees

Table 2.—Moisture content and sound cutting estimate of green ash seed harvested at three 21-day intervals in 1956 with seedbed germination in 1957 following room and cellar storage

Seed-trees	Dates of harvest	At harvest	Moisture Content ¹		Sound ² cutting estimate	Seedbed ³ germination	
			Room	Cellar		Room	Cellar
			----- percent -----				
A - 1	Aug. 22	53.0	6	14	87	9.8**	0.2**
	Sept. 12	52.7	7	13	92	15.2	20.2
	Oct. 3	9.4*	7	10	90	20.8	24.2
A-4	Aug. 22	54.7	6	14	89	3.2**	0.4**
	Sept. 12	49.3*	6	12	92	18.8	17.6
	Oct. 3	9.7*	7	10	89	22.6	15.0
A-2	Aug. 22	50.0	7	15	85	5.0**	0.0
	Sept. 12	46.8*	7	13	83	11.6	8.2
	Oct. 3	10.7*	6	10	82	9.2	5.6
A - 3	Aug. 22	48.5	7	15	95	2.2**	0.0**
	Sept. 12	46.2*	7	14	95	6.2	2.8
	Oct. 3	21.9*	7	10	93	9.4	3.6
Means	Aug. 22	51.6	7	15	89	5.0**	0.1**
	Sept. 12	48.8*	7	13	90	13.0	12.2
	Oct. 3-	12.9*	7	10	88	15.5	12.1

¹Percentage of moisture for 3 samples of 50 seeds after drying at 100° F for 24 hours.

²Percentage of sound seed based on cutting test for 3 samples of 100 seeds.

³Percentage seedbed germination in 1957 for Oct. 16, 1956 sowings of 5 replications of 100 seeds.

*Significantly less than for previous date of harvest.

**Significantly less than for later date of harvest.

Ash seed viability, when evaluated on the basis of seedbed germination, appeared abnormally low and varied from 0 to 24 percent. Evidently, green ash seed has a higher degree of dormancy than maple seed, and natural stratification for the after-ripening process was apparently inadequate due to the dry soil

conditions. Although germination capacity of the seedbed sowings was substandard, these results indicate ash seed should not be harvested until the moisture content falls to 49 percent on the average.

Further research is required to provide reliable guidelines for fall harvesting and sowing of boxelder

maple and green ash in the Plains region. However, results of this exploratory study suggested the following:

1. Moisture content of seeds appear to provide a superior measure of seed maturity than color of seeds.
2. The percentage of visually sound seed in cutting tests was evidently not related to either the maturity or germination capacity.
3. Maple seed for fall sowings apparently should not be harvested until the average moisture content falls to 57 percent.
4. Similarly ash seed should not be harvested until the average moisture content falls to 49 percent.
5. Storage requirements of seed until sown were not resolved.
6. Fall seedbed sowings of maple and ash seed require irrigation to promote the after-ripening process of stratification and ensure adequate germination.

Literature Cited

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