TABLE 1.—SUMMARY OF LABORATORY AND FIELD TESTING OF NORTHERN WHITE PINE SEED OBTAINED FROM HEAT-TREATED CONES OF THE 1936 SEED CROP

Original cone[1] treatment			Laboratory germinative capacity	Field germinative capacity	Tree[2] percent	Percent of viable seed germinating in field	Percent of viable seed producing trees	Losses[3]
Treatment	Kiln temperature	Duration of treatment						
No.	*°F.*	*Hours*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	100	2	94.1	76.7	58.0	81.5	61.6	25.0
2	100	4	93.1	70.8[4]	50.5	76.1	54.2	29.1
3	100	8	93.3	73.8	54.5	79.1	58.4	26.3
4	100	12	90.1	77.3	60.7	85.8	67.4	21.9
5	120	2	94.6	75.8	52.9	80.1	55.9	30.2
6	120	4	96.8	79.1	59.1	81.7	61.0	25.5
7	120	8	92.6	76.6	57.9	82.7	62.5	24.5
8	120	12	92.9	75.1	51.6	80.9	55.6	31.9
9	140	2	94.6	78.7	57.8	83.2	61.1	26.8
10	140	4	93.1	76.1	59.6	81.7	64.1	21.9
11	140	8	91.9	75.8	55.0	82.5	59.9	27.6
12	140	12	93.0	77.1	60.7	82.9	65.3	21.8
13	160	2	79.0[4]	64.2[4]	46.3[4]	81.3	58.6	28.1
14	160	4	69.9[4]	54.0[4]	38.4[4]	77.3	55.0	30.6
15	160	8	45.4[4]	35.9[4]	22.2[4]	79.1	48.9	38.8[4]
16	160	12	34.7[4]	25.0[4]	13.8[4]	72.1	39.8	45.5[4]

[1]All kiln treatments were made at a 6 percent wood equilibrium-moisture-content condition.
[2]Tree percent is defined as the percent of the number of seed sown developing into utilizable 1-year seedlings. As the seedlings were not graded the term is here used to mean the total number of 1-year seedlings.
[3]Losses are calculated as a percentage of the number of seed germinated in the field.
[4]Significantly different at P = 1 percent.

It is therefore apparent that seed injuries resulting from excessive heating during the extraction process are likely to be much greater than would be inferred from germination records obtained in the laboratory or field. It is reasonable to suppose that very important losses in first-year seedbeds may have occurred when seed extracted with uncontrolled temperature was used.

RAYMOND C. RIETZ,
Forest Products Laboratory.

A METHOD OF ESTIMATING AREA IN IRREGULARLY SHAPED AND BROKEN FIGURES

Where extreme accuracy is not essential or the time required by planimetering not justified or for some reason it is not practicable to use a planimeter, one method of estimating the area in irregularly shaped and broken figures is to rule a piece of tracing paper into small squares of known size and count the number of squares covered by the area to be measured.

This procedure was followed in detection planning studies at the Appalachian Forest Experiment Station, where it was necessary to determine the total area directly visible to numerous potential lookout points as shown on visible area maps. Instead of squares, the counting unit was a rectangle equal to 1/100 of a rectangle spanning one minute of latitude and one minute of longitude. Each of the tiny rectangles, therefore, represent approximately 6.95 acres. Continued counting of these rectangles was quite exacting and it was thought that an equally accurate and faster method might be devised.

Accordingly, a second overlay of one minute latitude by one minute longitude, was drawn up on which were placed 25 dots. Each dot was spaced at the center of an imaginary rectangle equal to four of the small rectangles used in the previous system and therefore represented a ground area of about 27.80 acres. An overlay grid covering the whole map and ruled into one minute rectangles enabled the worker to systematically follow through an entire map, counting each visible area once and only once.

Three visible area maps were selected representing types of maps commonly encountered, viz., visible areas in large and few, well-grouped bodies; visible area in small and scattered pieces; visible areas intermediate in size and somewhat scattered. Five men estimated the total amount of visible area on each of these maps by the two methods of counting rectangles and counting dots. The order in which men received the different maps was not systematic; when a man received a map he flipped a coin to determine which method he was to use first. Table 1 presents the deviations of each man's estimates from the measured area (as determined by planimeter) in percentage of the planimetered area.

The ratio of the mean difference between the two counting methods (2.66) and its standard error (0.605) is found to be 4.396. Since a ratio of this size in a sample of 15 differences would occur only once in about 1000 times by chance the conclusion is justified that the dot method used was superior. The results were particularly encouraging because dots were spaced only one-fourth as intensively as rectangles. Also, since the dot method required only two-thirds as much time as the other method and apparently lessened eye strain, it claimed a number of distinct advantages. The dot principle should be adaptable to other kinds of area determination problems.

TABLE 1.—ERRORS IN ESTIMATED TOTAL VISIBLE AREA, EXPRESSED IN PERCENT OF PLANIMETERED AREA, WITH DIFFERENT MEN APPLYING "DOTS" AND "RECTANGLES" METHODS TO SELECTED VISIBLE AREA MAPS

	Method Dots Percent error	Method Rectangles Percent error	Difference between methods Percent error
Map 1. Visible areas large, grouped			
Man A	1.84	2.45	0.61
" B	1.02	4.40	3.38
" C	2.25	5.11	2.86
" D	0.51	6.54	6.03
" E	2.25	0.61	—1.64
Map 2. Visible areas small, scattered			
Man A	2.09	5.46	3.37
" B	2.46	9.45	6.99
" C	2.95	4.54	1.59
" D	5.71	10.01	4.30
" E	0.86	3.74	2.88
Map 3. Visible areas intermediate, somewhat scattered			
Man A	0.41	2.81	2.40
" B	1.17	6.31	5.14
" C	1.24	1.99	0.75
" D	2.47	2.40	—0.07
" E	0.41	1.72	1.31
Sum	27.64	67.54	39.90
Mean	1.84	4.50	2.66

These tests were conducted while the writer was a member of the staff of the Appalachian Forest Experiment Station. The experiment was made possible by the participation of George M. Jemison, George M. Byram, Robert M. Beeman, and Brooke Davis.

C. A. ABELL,
California Forest and Range Experiment Station.

FROST DAMAGE TO FORESTS IN NORTHERN NEW JERSEY

Recent observations of widespread frost injury to forest vegetation in northern New Jersey indicate that late spring frosts may be a factor influencing the composition of forest stands. The injury was particularly severe in the valley bottom between Beech Glen and Rockaway Valley in Denville Township. The forest in this region occurs in a zone of transition from the oak-hickory type to the northern hardwood type, with the oak-hickory predominating. The stands are second-growth and vary in size from sapling to pole.

The species seriously affected by frost included the oaks, white ash, black locust, sycamore, tulip poplar, and hickory. The leaves of these species were completely killed, as were the more succulent shoots of white ash. Species not affected included black cherry, sugar maple, large-tooth aspen, yellow birch, American elm, basswood, and beech.

Records of minimum temperature and frost obtained from the U. S. Weather Bureau for the stations nearest to the Rockaway Valley were reported as follows:

	1938 May 13	1938 May 14
Charlotteburg, N. J.	28°F. Killing frost	26°F. Killing frost
Dover, N. J.	32°F. Heavy frost	33°F. Heavy frost
Boonton, N. J.	33°F. No record	32°F. No record

While these temperatures were not recorded in the immediate vicinity of the area in which greatest injury was observed, they indicate that in general the temperature was not so low as might be inferred from such severity of injury; lateness of the season was apparently of more