Reprinted from the JOURNAL OF FORESTRY, Vol. 70, No. 10 October 1972.

Nitrogen Fertilizer Increases Diameter Growth of Northern Red Oak

Jack J. Karnig

General agreement seems to prevail among foresters that fertilization stimulates tree growth. Many recent trials and experiments point up growth increases induced by adding nitrogen, phosphorus, and potassium. That these amendments last several years is not at all surprising, but only long-term experiments will prove this point.

A fertilizer experiment with a 12-year record is located at the Harvard Black Rock Forest in southeastern New York in the mixed-oak-hardwood type.

The 80-year old stand of 31.2 acres was heavily thinned during the winter of 1956-57. An average of 50 crop trees were retained and all other vegetation cut and piled. Post-logging diameters ranged from 7 to 19 inches d.b.h. In 1959, basal area measured 43 square feet, with northern red oak (*Quercus rubra* L) accounting for about 75 percent of the total stand. Most of the trees on the study area have been free to grow on two or three sides since the 1956-57 thinning.

The fertilizer trial, using ammonium nitrate (33.5-0-0) at 400 lbs. available nitrogen per acre, was established in April 1966. One acre of the mixed-oak-hardwood forest was fertilized by broadcast application. Beginning in 1961 and continuously through the 1971 growing season, aluminum dendrometer bands have recorded changes in diameter at breast height on seven representative northern red oaks within the acre which was fertilized in 1966. Another seven oaks of the same size and condition, located within the same stand a short distance away, served as control. The latter trees were well outside the fertilized acre but not more than 400 feet away.

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Table 1. Annual Increment, in Square Feet Basal Area, of Unfertilized and Fertilized Northern Red Oak

Growing Season	Unfertilized	Fertilized	Fertilized difference
			percent
1961	.298	.266	− 11
1962	.158	.221	+ 40
1963	.256	.244	− 5
1964	.303	.247	− 18
1965	.186	.173	− 7
1966	Fertilizer applied April 26.		
1966	.135	.174	+ 29
1967	.119	.278	+134
1968	.192	.300	+ 56
1969	.250	.377	+ 51
1970	.191	.250	+ 31
1971	.113	.189	+ 67

The combined basal area increment of each of these two groups of trees (*Table 1*) shows an apparent response to the nitrogen amendment, and it seems evident that one application of nitrogen has stimulated growth for six years. □

SOUTHERN PINE SEEDS GERMINATE AFTER FORTY YEARS' STORAGE

James P. Barnett

What may be the world's oldest viable pine seed has now passed its fortieth year.

Slash pine (*Pinus elliottii* Engelm. var. *elliottii*) seed collected and stored in the fall of 1931 showed 70 percent normal germination when tested in 1971. An additional 8 percent germinated abnormally. Shortleaf pine (*P. echinata* Mill.) seed collected at the same time was down to 23 percent normal germination, plus 16 percent abnormal.

The difference in viability is probably the consequence of storage conditions. The slash pine seed has been stored in a glass jar with an airtight cover. The shortleaf seed has been kept in a metal can with a slip-fit cover, and air leakage may have increased seed moisture content and accelerated deterioration. Storage temperatures have been 1° to 3°C.

In a previous test after 35 years, normal germination was 82 percent for slash and 50 percent for shortleaf. Viability has thus declined considerably, particularly in shortleaf. The high abnormal germination confirms that the seeds are in low vigor; after 35 years abnormal germination was 3 percent for both species.

The 1971 tests were with unstratified seed only, both to conserve the supply and because at least two previous tests indicated no advantage from stratification.

Details of storage conditions and testing methods, together with mean germinations at various times during the first 35 years, were published by P. C. Wakeley and J. P. Barnett in the *Journal* (66:840-841) in November 1968.

Storage will continue. Enough seeds remain for several additional tests. □

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