



Patterns of Oak Recruitment in Selected BNL Woodland Communities

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Abstract

The normal progression of forest development in the Long Island Pine Barrens of central Suffolk County begins with pitch pine. Over time, the pitch pines are out-competed and replaced by a hardwood forest composed of oak and hickory. However, a preliminary survey of woodlands at Brookhaven National Laboratory showed a virtual absence of hardwood seedlings and saplings. This survey was accomplished by establishing seven circular plots with a radius of 10 meters each to determine the effects of the shrub layer on oak recruitment. Two of the plots had a recent fire history. These plots had a greater number of oak seedlings and saplings than in the areas with no fire history. Prescribed burning is often used as a technique to manage for the perpetuation of pine barren communities. Our data, however, suggest that fire may accelerate, not retard, succession toward oak dominance. In conclusion, the shrub layer in an unburned woodland may prevent oak recruitment while fire reduces the shrub layer, thereby encouraging the establishment of oaks.

Introduction

In central Long Island, pitch pines are considered to be the first successional species. Over time, the pitch pine is out-competed by hardwoods. The forest types in the study areas at Brookhaven National Laboratory ranged from oak-pine to pine-oak forest. A preliminary survey of the BNL woodlands showed few, if any, oak seedlings and saplings. These observations suggested a study to assess oak recruitment. Seven study plots were established to determine the effects of the shrub layer on oak recruitment. Of the seven plots, two had a recent fire history.

Methods

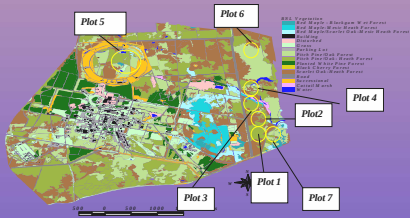
This survey was accomplished by establishing seven circular plots with a radius of 10 meters each. The mature trees in each plot were tagged and counted.^a In addition, all of the oak seedlings and saplings were counted. Seedlings were considered to have a DBH of 2 cm,^{b,e} while saplings had a DBH between 2 and 5 cm.^c Sediments were sampled by use of a soil borer.^d

All data are given in the following table and graphs.

Characteristics of Study Plots

Plot	DBH (Cm)	Cover by Shrub layer Blueberry/Huckleberry	Oaks			Pines	Litter
			Mature	Seedling	Sapling		
1	23	93%	8%	88%	4%	11	2.5
2	27	96%	4%	53%	4%	16	3.0
3	7	90%	5%	90%	5%	19	1.7
4	35.5	75%	1.5%	97%	1.5%	15	1.5
RHIC 5	25	98%	73%	0%	27%	14	2.3
BNL North 6	25	85%	11%	89%	0	4	4.5
Pocomo River Road 7	16	98% Max with ferns	50%	41%	9%	2	4

Description of Study Sites



Plots 1, 2, 3 were in the Upton Reserve. Approximately 50% of each plot had a dense blueberry/huckleberry shrub layer while the remainder had no shrub layer. The oak seedlings were non-randomly distributed and were present only in areas with no shrubs.

Plot 4 was also in the Upton Reserve. This plot had a more open canopy and a lower density of shrubs. The oak seedlings were randomly distributed.

Plot 5 (RHIC) Fifty percent of this plot consisted of an oak-pine woodland while the remainder had all trees removed ca. 1979. The entire plot had a dense blueberry/huckleberry shrub layer with no oak seedlings or saplings present.

Plots 6, 7 These plots had an open canopy with a relatively dense shrub layer. The highest density of seedlings was found in these plots, which had burned within the past 10 years.



a



b



c



d



e

Discussion

The data indicate that many factors are involved in oak recruitment. In areas with a dense shrub layer recruitment is very low due to a variety of factors, such as shading and root competition. The number of seedlings was highest where the shrub density was low or absent.

Study sites 6 and 7 had the highest number of saplings. These areas had a recent history of fire, which most likely reduced or eliminated the shrubs for a time after the fire and resulted in the presence of seedlings and/or saplings.

In conclusion, the data indicate that fire favors the regeneration of oaks over pines as suggested by Conard (1935) and Boerner, et al. (1987) while the shrub layer in unburned areas prevents oak recruitment.

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References

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