

Is fertilization the "silver-bullet" to increase white oak acorn production?

Jarred M. Brooke
M.S. Candidate
University of Tennessee
Dept. Forestry, Wildlife, and Fisheries
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Iowa State Forestry Extension

Importance of Oaks and Acorns

Important food source for many wildlife species

Acorns production influences:

- Movement (McShea and Schwede 1993)
- Foraging (McShea and Schwede 1993)
- Condition (Campbell and Wood 2003 and Eller et al. 1986)
- Population dynamics (McShea 2000)

Oaks are economically important

Andrew McKean, Outdoor Life

Acorn Production

Acorn production is highly variable

- Year to Year
- Species to Species
- Tree to Tree

Not predicted by tree characteristics (Lashley et al. 2009)

White Oak Production


1 in every 4 years is a good mast year (Beck 1977, Beck and Olsen 1968)

INFLUENCED BY WEATHER AND INSECTS (Olson and Boyce 1971)

Influencing Acorn Production



Thinning forest stands? (Healy 1997, Perry 2003)

Fertilization?



Objective

Investigate the effects of fertilization and thinning on white oak acorn production



Study Area

Chuck Swan State Forest

3 Stands

Southern Appalachian Ridge and Valley

24,444 acres, 92% forested

Oak-Hickory

80- year rotation

Acidic silt loam soils





Data Collection

120 white oaks
Dominant/codominant

Three, 1 m² mast baskets per tree

Acorn collected from Sep-Nov (2006-2013)
Float-test was used to determine soundness

Up to 30 sound acorns returned to each tree to estimate depredation rate



Experimental Design

Fall 2006-2010
Pre-treatment data

Trees placed in production classes (Healy et al. 1999)

Excellent, Good, Moderate, and Poor

Treatments

- Control
- Fertilized
- Thinned
- Thinned and Fertilized



Experimental Design

Winter and Spring 2011

Treatments applied

Complete release of crown

Fertilizer recommendation based on soil sample (N-P-K)

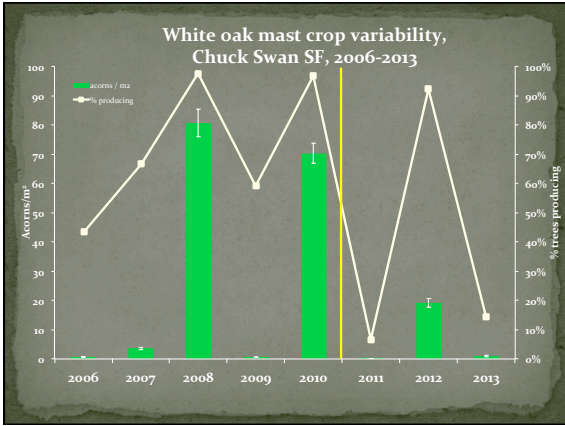
Stratified within production classes

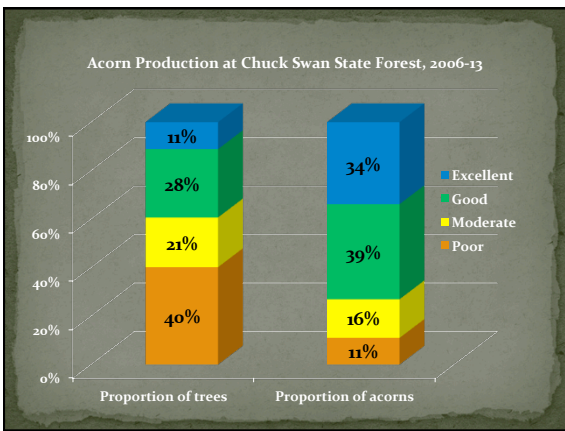
Spring 2012-2013
Nitrogen added to fertilized trees

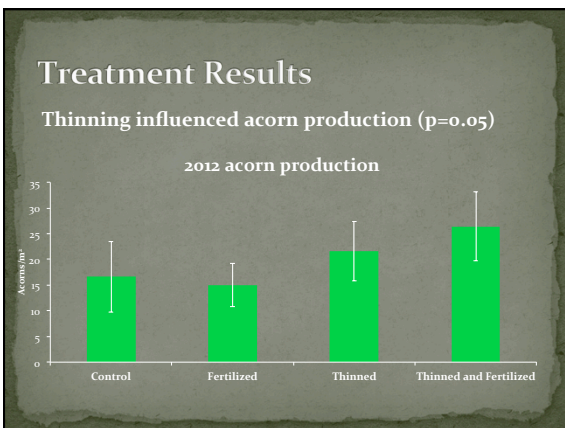
Data Analysis

- Acorns per m² of crown
- Randomized Complete Block ANOVA w/ Covariate
- Log-transform data









Fertilizer Program

Do the potential benefits outweigh the costs?

Fertilizer Program	Retention Cut w Fire <small>(Ashley et al. 2010)</small>
59 trees	\$119 per acre
3.2 acres per year	15 acres
\$1733 total	\$1733 or less
\$180 per acre	14,520 lbs of forage
No increase in production	\$0.09 per 1 lb of forage

Managing Oaks for Wildlife

Identify best producing trees

Thinning
Remove low value species
Remove poor producing oaks

Retain diversity of trees





1378 lbs (dry wt/ac)

Conclusions

1 out of 4 years is a good mast year (Beck 1977, Beck and Olsen 1968)

Fertilization has not increased acorn production

Fertilizing is expensive

Thinning increased acorn production (Healy 1997, Perry 2007)

Secondary benefits

No treatment influenced production in poor years

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Literature & Pictures cited

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Andrew McKeon, *Outdoor Life*

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