EXPLORING ECONOMICS OF LOBLOLLY PINE MANAGEMENT IN DROUGHT USING EFFICIENCY ANALYSIS

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EXTENDED ABSTRACT

Loblolly pine (*Pinus taeda*) is the most commercially important softwood in the Southern United States. Given its faster growth and the associated timber product price premiums, active forest management tools such as fertilization and thinning have long been used to increase loblolly pine growth in the Southern States. In Oklahoma, however, the precipitation gradient in the State has confined its growth in the southeastern counties where the trees grow under more xeric conditions than in most of the Southeast. With decreased stomatal conductance, photosynthetic rates, and transpiration caused by periodic droughts, the growth response of loblolly pine to active management may be different in Oklahoma. Therefore, this study was aimed to understand the economics of active management (e.g., thinning and fertilization) on loblolly pine growth, with and without drought in Oklahoma.

We used an efficiency analysis, known as data envelopment analysis (DEA), to understand the financial effectiveness of thinning and fertilization in loblolly pine plantations in Broken Bow, OK. Of note, the efficiency analysis gauges effectiveness by capturing inputs and outputs of any production system. In simple terms, a regime is considered most efficient if it utilizes minimum input to maximize output.

The requisite data for DEA was obtained from the Tier III site of Pine Integrated Network: Education, Mitigation, and Adaptation Project (PINEMAP). The growth in tree height and diameter were used as an input in the Forest Vegetation Simulator to project timber product volumes within pulpwood, chip-n-saw, and sawlog categories. The timber price information was obtained from the annual timber price reports published by the Texas A&M Forest Service. A slack-based data efficiency analysis was used to obtain effectiveness in terms of product and profit, which are called technical and economic efficiencies, respectively. Finally, information from both technical and economic efficiencies were used to obtain overall efficiencies.

The study results suggested that while thinning increased efficiency, +28 percent, across the board, fertilization as a stand-alone application was not financially attractive. The combination of thinning and fertilization, however, was the most efficient management regime. The study further suggested that efficiencies, -24 percent, associated with both thinning and fertilization will be negatively impacted by drought. Study results provide important information that can help landowners to navigate the best course of management actions to optimize return on their timberland investment under potential drought conditions.

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