Biomass Cropping and Effects of Thinning on Different Provenances of Loblolly Pine on the Piedmont of North Carolina

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A loblolly pine biomass/cropping study was planted by TIP staff near Butner, North Carolina in the spring of 2012. The purpose of the study was to evaluate different genetics (provenances and families) under various silviculture regimes to guide landowners looking to maximize their financial returns in both the bioenergy and sawtimber markets. The study site is in the Piedmont of NC, and a feature of the study is the inclusion of Coastal-source families to determine if the risk of cold damage is offset by their faster growth and the presence of a bioenergy market (where damaged trees can be commercially thinned). The study includes ten families from the Coastal Plain provenance and ten from the Piedmont. The test was established at a high planting density (1,037 trees per acre). In the fall of 2020, three thinning treatments were applied: no thin, moderate thin (519 residual trees per acre), and heavy thin (288 residual trees per acre). These thinning scenarios were designed to allow comparison of scenarios focusing on biomass production versus biomass and sawtimber production.

Evaluating the no-thin treatment at age 11 years, families from warmer sources tended to have more green tons per acre (**Figure 1**). The colder-source families tended to have better sawtimber potential (**Figure 2**). Seed sources moved northward often outperform the local source, but if they are moved too far northward, they suffer cold damage and do not perform as well as the local source (Wells and Wakeley 1966; Lambeth et al. 2005). This seems to be the case for the families in the Butner trial. Out of the six top families for the no thin treatment, five of them are from a coastal source. The top five families that have the highest proportion of trees with sawtimber potential are from a piedmont source. Coastal families tend to have higher wood volume while piedmont families tend to have better sawtimber potential, on this piedmont site.

Figure 1. Green tons per acre at age 11 years.

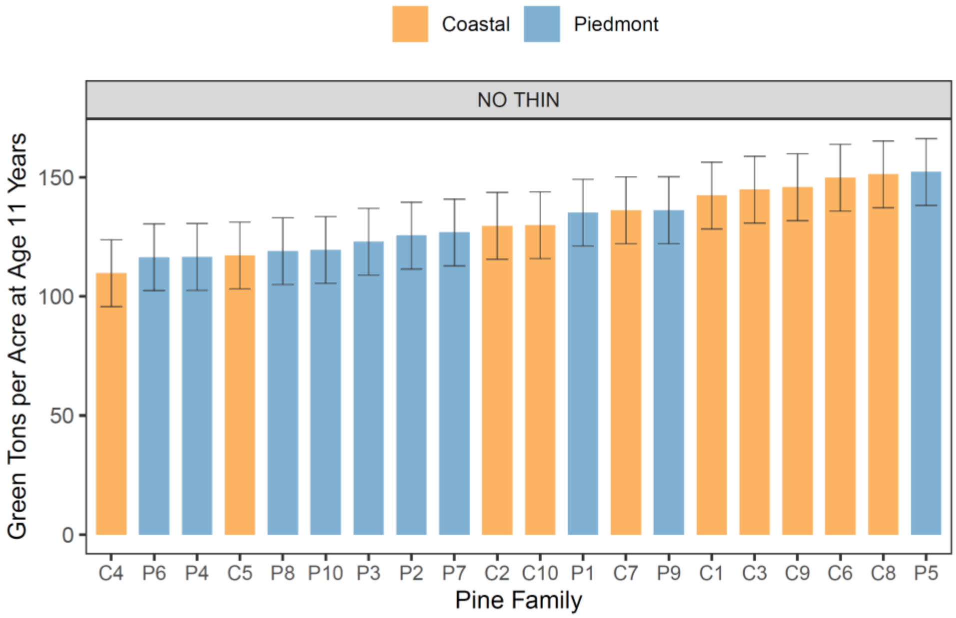
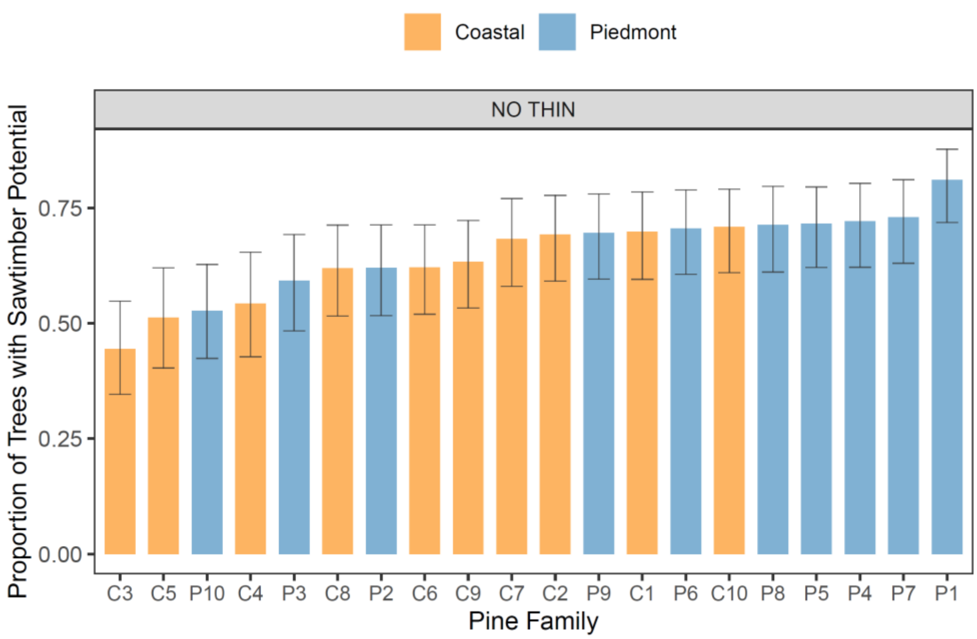
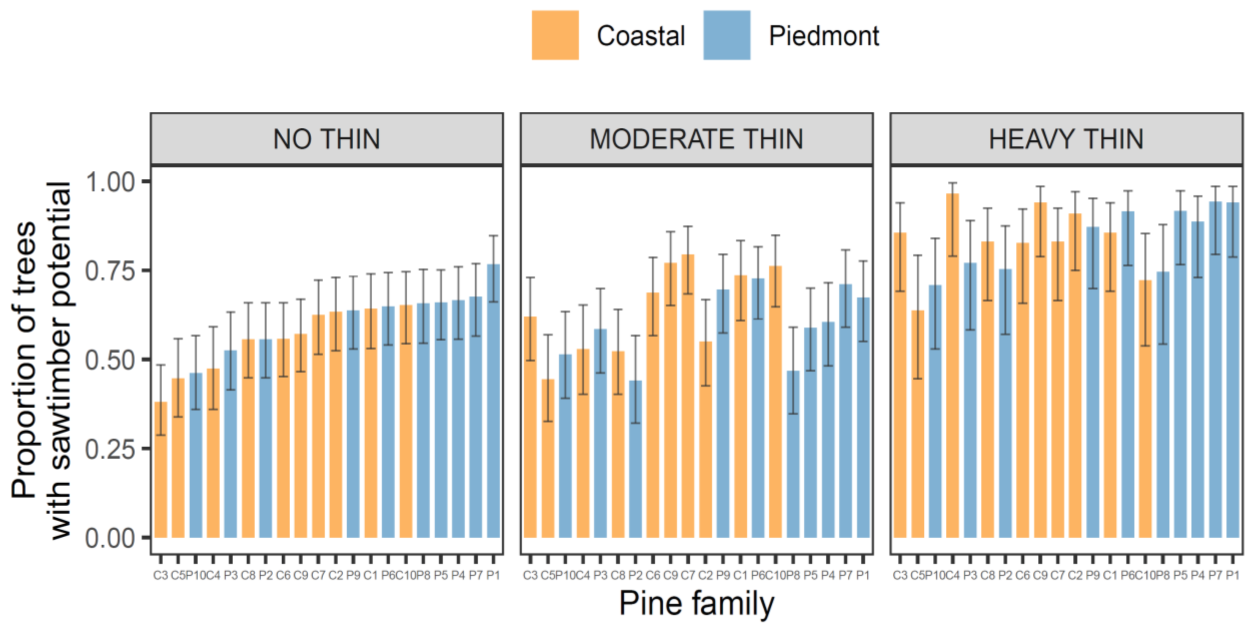


Figure 2. Proportion of trees with sawtimber potential at age 11 years.



The no-thin treatment has fully occupied the site and has begun to experience mortality from self thinning, as it has entered the "stem exclusion" stage of forest stand dynamics. In the thinned areas, the form of the trees tends to be much better, likely due to thinning from below. Stem form tends to be best in the heavy-thin treatment, but trees with repeated cold damage can be found in all the thinning treatments and provenances. Figure 3 shows how the proportion of sawtimber potential for each family increases in the heavy thinning treatment. The families are in order from smallest proportion to largest for the no-thin treatment. This is to be expected, because in the thinning we removed most of the defective trees that did not have good sawtimber potential. Further work needs to be done to understand seed transfer distance and how that distance for each family affects green tons per acre and sawtimber potential.

Figure 3. Proportion of sawtimber potential for each thinning treatment at age 11 years.



Acknowledgements: This research was supported by funding from the North Carolina Department of Agriculture and Consumer Services Grant #17-072-4031. Special thanks is given to the undergraduate and graduate students in the Cooperative Tree Improvement Program for test measurements.

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