**Project Summary**

The project is designed to assess growth rates of balsam poplars under short rotation on an experimental landfill in Southcentral Alaska to determine their applicability as a sustainable heating fuel for rural Alaska communities.

**Project Need**

Balsam poplar grows naturally in Alaska and is generally found north of the Alaska Range. However, very little information is known about the growth rates of balsam poplar under short-rotation management.

Understanding the growth rates of balsam poplar is important when planning to use it as a biomass energy resource. Knowing the length of time between harvests can help decide if a stand of trees can provide enough wood to be a sole resource or if it would be better used to supplement another source of biomass.

**Project Description**

In 2004, 144 trees, including balsam poplar, were planted on an experimental landfill cap on Elmendorf Air Force Base to observe the evapotranspiration effects of the trees in removing ground water from a landfill site. In 2010, those trees were harvested. Fertilizer was applied to half of the trees and regrowth from the roots of those trees (coppicing) was observed for two years.

In 2012, the diameter of the two-year-old resprouted tree stems was measured at both 12 and 51 inches above the ground. The trees were then harvested and weighed for total wet biomass. The trees were dried at 105°C until bone dry and then reweighed for total dry weight.

The measurements taken were used to create an equation to predict the amount of biomass in a standing tree.
Project Results

The biomass collected in the first harvest (7+ years growth) weighed 9.6 ton/acre; after two years, the regrowth measured 5 ton/acre or 2.4 ton/acre/year. The trees in the second rotation grew faster because of the well established root system.

The trees in the fertilized area did not grow any faster than those in the nonfertilized areas; however, more weeds were observed in the fertilized area.

The dry weight of the stems was plotted against the diameter of the stems to create an equation to be used to measure trees of the same species and age to determine the amount of biomass in the live tree. This can be a useful tool when deciding when to harvest a tree for biomass energy.

The balsam poplar wood was also tested for energy content using a bomb calorimeter. The biomass harvested in the second rotation contained an average of 8460 Btu/pound, or the equivalent of 631 gallons of diesel fuel per acre using a straight conversion.

Project Conclusions

Short rotation woody biomass may be a viable option for some areas of Alaska. Managing the local poplar, aspen, willow, and other hardwood species for short rotation can be an alternative to planting a crop. These trees, if managed well, can supplement slower-growing species like spruce and birch. Using trees close to the community can also decrease the cost of harvesting wood.

More research is needed to understand the optimal rotation length between harvests. A longer rotation time of 10 to 20 years may allow enough biomass to accumulate per acre to provide the majority of the biomass fuel needed annually.

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