

Aspen-Triticale Alleycropping system: effects of landscape position and fertilizer rate

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Short-rotation woody crops offer several key advantages over other potential bioenergy feedstocks, particularly with regard to nutrient inputs and biomass storage. However, a key disadvantage is a lack of income for the grower early in the rotation. Alleycropping offers the opportunity to grow annual crops for income while the trees become established. However, species selection is important to minimize competition for resources between the trees and the annual crops. While winter crops seem well-suited for such purposes, little attention seems to have been devoted to their use in alleycropping systems. In this study, an alleycropping system consisting of the hybrid aspen clone 'Crandon' and winter triticale is evaluated.

The study site is located approximately 15 miles southwest of Ames, IA (USA). During spring 2009, the hybrid aspen clone was planted into a strip-killed cover of triticale (72 trees per plot x 5 landscape positions x 3 replications = 1,080 total trees). Variable fertilizer rates were randomly assigned to a subset of 360 trees (6 trees per fertilizer rate x 4 fertilizer rates x 15 plots). The fertilizer rates were 0, 10, 20, and 40 grams (in the form of 10-gram tablets of slow-release 20-10-10 fertilizer placed in the planting hole). Tree heights were measured at mid-season and at the end of the growing season. Of the trees assigned to variable fertilizer rates, a subsample of 120 trees were harvested (2 trees per fertilizer rate x 4 fertilizer rates x 15 plots) for evaluation of height-to-diameter ratio, taper, and aboveground biomass production. In addition, the roots of 60 trees (1 tree per fertilizer rate x 4 fertilizer rates x 15 plots) were excavated for evaluation of root taper and belowground biomass. Analyses of carbon content are to be conducted on the aboveground and belowground portions of the trees as well.

Data analyses completed thus far indicate a significant effect of fertilizer on tree height growth early in the growing season, with a diminished effect by the end of the first year. In addition, tree height growth was generally consistent across landscape positions, with the exception of the floodplain where weed pressure was especially high. Winter triticale yields were less consistent across landscape positions and appear to be correlated with site quality. Analyses of height-to-diameter ratio, taper, aboveground biomass, belowground biomass, and carbon content are currently underway and will be described in the final version of the poster. Also, preliminary results from second-year tree height growth and winter triticale yields are expected. Finally, some pest management considerations will also be discussed.

Alleycropping, fertilising, biomass production

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