Kenaf; an Ecological Source for Paper

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Rationale:

America's primary source of paper pulp is southern white pine. As the "green" market continues to grow, consumers are seeking alternatives to traditionally sourced tree-based papers such as "ecofriendly" and recycled non-woody paper and fiber products. Kenaf (*Hibiscus cannabinus* L.) is a warm season annual fiber crop and has proven to be as good as or even better for paper production compared to trees. Distinguished characteristics of kenaf for paper production include low lignin content and naturally whiter fiber, which can be translated into a decreased requirement for bleaching. Thus, kenaf can produce paper that requires less energy while substantially reducing environmental pollution.

Research Goals:

In this project, we are evaluating basic agronomic practices including variety adaptation, population density and time of planting for growing kenaf in Massachusetts.

Treatments:

Four kenaf varieties; Tainug, Everglade-41, Whitten, and Dowling were planted in three-rows plots, 2.5 ft wide and 25 ft long. Plantings began on May 11th, when the danger of frost had passed and the soil temperature reached about 56 ^{o} F, and continued on May 18th, and May 25th. Seeds were planted 2.8 inches apart on 30-inch rows, which is equal to 25,000 plants per acre. A cone type distributor mounted on a double disc opening corn planter was used for planting in a conventionally prepared seedbed.

Weeds were controlled nonchemically using a combination of hand-weeding, cultivation between the rows, and mulching with rye straw.

Results:

A summary of total biomass yield is presented in Table 1.

Table 1: Kenaf total biomass yield.

Variety*	**Date of Planting 2010**			**Variety**
	May 11th ton/ acre^{-1}	May 17th ton acre^{-1}	May 25th ton/ acre^{-1}	Avg. ton/acre^{-1}
Whitten	5.5	5.0	3.5	4.6
Everglade-41	5.2	4.6	3.0	4.3
Tainung 2	4.1	7.9	4.3	5.5
DOP Avg.	4.9	5.8	3.6	

*Dowling variety was not harvested due to very poor stand.

The early May plantings of kenaf experienced low temperatures during germination and early stages of growth, therefore hindering early plant growth. This permitted weeds to grow fast and dominated the crop. Low final densities in some plots allowed sever branching, which is not suitable if kenaf is grown for paper. Branching reduces the main/central stalks ability to maximize in diameter. Large diameter central stalks are desirable because they contain more usable lignin as compared to a small central stalk plants with many branches. Due to the short day length condition in Massachusetts, none of the varieties used in the experiment bloomed. This could be considered as a potential advantage because food reserves will be used for root and stem growth instead of flower and seeds.

2011 Experiment:

Based on the preliminary results obtained in 2010, we are continuing our evaluations of kenaf production in Massachusetts. Three kenaf varieties; Tainug, Everglade-41, and Whitten were planted on May 10th, at three planting densities; 27,000, 30,000, and 33,000 plants per acre. Weeds were controlled in a combination of ways; Treflan, a pre-plant herbicide was used at the rate of 1.25 pints/acre, white clover was interseeded on a selected section to evaluate its effects on weed control, and cultivation was used in between rows for a period of time till the plants became too large for the tractor. Plots received 600 lb/acre of 15-8-12 fertilizer at the time of planting. Data collection this year includes: plant height, total biomass, and leaf dry weight.

For more information about this research project contact Masoud Hashemi, masoud@psis.umass.edu.