EFFECT OF TILLAGE METHOD, COVER CROP AND NITROGEN RATE ON YIELD OF KENAF

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Kenaf is a potential alternative crop for the southeastern United States. Kenaf was planted using conventional and reduced tillage methods after two cover crops (crimson clover, ryegrass) and a fallow treatment for two years. Superimposed on tillage method and cover crop was nitrogen rates of 0, 34, 68, and 136 lb/A. Kenaf planted in a cover crop yielded more, was taller, and had thicker stems than when planted in fallow. There was no difference in yield or plant height attributable to tillage method. Conventionally planted kenaf had higher plant populations and thinner stems than when planted no-till. Application of 34 lb/A of nitrogen resulted in yields greater than 0 nitrogen but not different from as much as 136 lb/A. High nitrogen rates reduced stand and increased stem diameter but had no significant effect on plant height. There were no significant interactions with nitrogen rate and tillage method or cover crop. There was a significant interaction between tillage method and cover crop. Kenaf planted in conventionally tilled clover plots yielded more than kenaf planted no-till, this difference was not evident in the other cover crop treatments.

INTRODUCTION

Kenaf has the potential to become an important alternative crop in the southeastern United States. Existing newsprint factories in Mississippi have shown considerable interest in kenaf as an additative to wood pulp in their paper making process. With this in mind a kenaf cooperative has been formed in north Mississippi, to grow, conduct research, and promote the use of kenaf. Eight hundred hectares of kenaf have been planted for use in fiber separation. Plans are underway in South Carolina to build a fiber processing plant that will require 14,000 ha of kenaf. Basic information concerning tillage methods and fertility requirements must be developed for successful production and later industrialization of this new crop.

Kenaf is not a new crop in the United States but is experiencing a rebirth of interest. In the early 1970's this crop was introduced to south Mississippi but lack of effective storage methods made commercialization impossible (3). Solutions to this problem have been found, bringing commercialization a step closer. Current interest in kenaf production extends across the southeastern United States. In south Texas, the USDA-ARS and Rio Farms have been engaged in research for several years. Scientists from Texas to South Carolina are engaged in kenaf research including variety evaluation, weed control, planting date, disease, plant-parasitic nematodes, fertility, and storage experiments.

The recommended cultural practice for planting kenaf is a well prepared seedbed but as with most clean cultivated crops this increases the cost of land preparation and has the potential to increase soil erosion (1).

Limited information is available on the response of kenaf to nitrogen from legumes. Research in Florida and Georgia showed that fertilizer nitrogen rates above 103 kg ha^{-1} did not increase yields (4). In Kansas research has shown that nitrogen rates above 51.5 kg ha^{-1} did not increase yields (5). In Alabama, cotton planted after legume cover crops produced cotton lint yields comparable to cotton fertilized with rates up to 68 kg N h^{-1} (3).

MATERIALS AND METHODS

Kenaf was planted conventionally and no-till after two cover crops (crimson clover, and ryegrass) and fallow at a rate of 8 lb/A in 40 inch rows. Plot size was 14 X 20 feet. This experiment was a split-split plot design with cover crop as main plot. tillage as sub plot, and nitrogen rate as sub, sub plot with 4 replications. Cover crops were planted in October each year. Nitrogen fertilizer was applied to the ryegrass at planting at 68 lb/A. Potash and phosphorous were applied to maintain a high soil test level. Cover crops were killed with glyphosate in early April and kenaf planted 14 days later using a no-till planter equipped with rippled colters. Four nitrogen rates (0, 34, 68, and 136 lb/A) were applied to each cover crop x tillage treatment at

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Table 1. Effect of cover crop on height, stand, stem diameter, and yield of kenaf. MAFES South Mississippi Branch. a two year averaae 1992-1993.

Cover crop	Plant heiaht	Plant stand	Stem diameter	Dry matter yield
	ft	plants/A	mm	lb/A
Crimson clover	13.0	16764	18.2	13036
Fallow	12.2	31200	14.0	10625
Ryegrass	12.6	16764	17.4	11696
AVE	12.6	22262	16.5	11786
LSD (0.05)	.6	4292	1.3	1517
CV %	7.3	25.2	16.7	20.6

Table 2. Effect of tillage method on height, stand, stem diameter, and yield of kenaf. MAFES South Mississippi Branch, a two year averaae 1992-1993.

Tillage method	Plant heiaht	Plant stand	Stem diameter	Dry matter yield
	in	plants/A	mm	lb/A
Till	151	33123	15.8	12053
No-till	152	21258	17.3	11517
AVE	151	27190	16.5	11785
LSD (0.05)	NS	3539	1.0	NS
CV %	7.3	25.5	16.7	20.6

Table 3. Effect of nitrogen rate on height, stand, stem diameter, and yield of kenaf. MAFES South Mississippi Branch, a two Year average 1992-1993.

Nitrogen rate	Plant height	Plant stand	Stem diameter	Dry matter yield
lb/A	in	plants/A	mm	lb/A
0	149	24197	14.1	9821
38	153	21796	16.3	12232
76	151	23361	17.3	12518
152	152	19695	18.4	12616
AVE	151	22262	16.5	11803
LSD (0.05)	NS	2272	1.1	982
CV %	7.3	25.2	16.7	20.6

planting. Plant height was measured at harvest from the ground to the apical tip. Plants in 13 feet of row was counted at harvest in each plot to determine plant population. Eight stem diameters in each plot were measured 4 feet above the ground. Yield was determined by harvesting 13 feet of row and converted to lb dm/A.

RESULTS

Averaged over two years, kenaf planted in a clover cover crop was taller, had thicker stems, and yielded more than when planted in fallow (Table 1). Kenaf planted in the fallow treatment had a higher plant population than kenaf planted in either clover or ryegrass.

There was no difference in yield or plant height attributable to tillage method (Table 2). Conventionally planted kenaf had higher plant populations and thinner stems than when planted no-till.

Application of 34 lb/A of nitrogen resulted in yields greater than 0 nitrogen but not different from as much as 136 lb/A of nitrogen (Table 3). High nitrogen rates reduced stand and increased stem diameter but had no significant effect on plant height. There were no significant interactions with nitrogen rate. In clover plots kenaf planted in conventionally tilled plots yielded more than kenaf planted no-till, this difference was not evident in the other cover crop treatments.

DISCUSSION

These data indicate that kenaf can be grown after a ryegrass or clover cover crop using either conventional or no-till culture without a detrimental effect on dry matter yield. This not only reduces the cost of production by eliminating trips across the field but also gives farmers a method to reduce soil erosion. Nitrogen rates over 34 lb/A did not increase yields. This not only keeps the cost of production down by using small amounts of nitrogen but also reduces the chances of non-point source pollution.

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