Kenaf in Eastern North Carolina

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Thank you for the invitation. I am a tobacco and cotton farmer, and I am going commence by talking to you briefly about the history of kenaf. Kenaf is a plant indigenous to Africa. It is currently being grown in several areas throughout the world, mostly in warmer climates. It is a member of the hibiscus family, and is grown primarily for its fiber. The US government, after World War II, did a lot of research involving kenaf, which was to be used as a replacement for imported fiber crops such as hemp, ramie and jute—used primarily in cordage production. There has been a lot of research on kenaf across the United States, involving many universities, including North Carolina State University. Dr. Bill Fike did a lot of research back in the mid-80s on kenaf production, which was carried out primarily in the blacklands of North Carolina. He looked at producing kenaf as a replacement for hemp bast fibers currently used in the production of cigarette paper. He demonstrated that kenaf can be grown in North Carolina, and that you could successfully produce enough tonnage at a given price to produce profit for the farmer. The cigarette industry, however, did not accept kenaf as a viable replacement. There were some issues about contamination from the soil, and taste in the cigarettes from the kenaf paper.

Kenaf is currently grown in Texas, Mississippi, Florida, Louisiana, Oklahoma, Georgia, and North Carolina. It has been grown in Maryland, Pennsylvania and Delaware. The primary production areas, prior to the last couple of years, have been in Texas and Mississippi. The Texas area of production has been growing several thousand acres for many years and they have been selling their production into markets including the automobile, paper and building products industries. In Mississippi, they initially produced kenaf for the manufacture of paper. That did not work out well, so they have been selling the product into the animal bedding industry with a small proportion of the bast fiber, which I will touch on later, going into paper production.

My experience with kenaf began in January 2000. After the flood of 1999, we experienced significant losses. We also saw a decline in income from tobacco and row crops such as cotton, corn, and soybeans as a result of low commodity prices. A group of nine farmers in Greene and Pitt Counties began to explore the possibility of growing kenaf on the farmland in North Carolina. We proceeded to purchase some seeds out of the Mississippi State University stock, and we planted the crop. We had about 25 acres in the year 2000. We monitored the test plots, harvested the crops, and then we sent the fiber to Canada to have it processed in a hemp processing facility (we did not perceive the current processing technology being used in Texas and Mississippi as capable of supplying a high enough quality fiber to enter certain markets that we were pursuing). We received those fibers back from Canada around January or February this past year. In fact, we sent samples to several of the customers that we were pursuing and we are proud to say that the specifications of the fi-

bers exceeded what they required. We continue to send samples around the world: to Japan, France, Belgium, Germany, as far away as California here in the United States and then up into the automobile production area around Ohio and Indiana.

I am going to touch on the production of kenaf in North Carolina—particularly our most recent crop that was planted this past spring (about the 20th of June, although generally this crop should go in the ground much earlier than that date). Kenaf needs to be planted after the last frost-free day in April and then should be completed by the 1st of June. We were late getting the crop in this year in some instances. This crop is extremely hardy—the seeds jump out of the ground in a matter of two or three days after planting, and it grows very quickly (see Figure 1). We are purchasing our seed out of Mexico. You cannot produce this seed in Eastern North Carolina, although you can in the very southern regions of Florida and Texas. Around here, about the time it starts fruiting—going to flower—we are going to have frost, so you do not get any seeds here.

Most of the production in Greene and Pitt Counties has been on 7-1/2 to 15-inch rows. This crop will mature in about 120 days and it will reach a height of around 10 to 12 feet. And at that particular time, it is time to start cutting the crop. Figure 2 is an example of cutting—this was in late September of 2000. We just used a standard sickle bar mower, and you can see that is a small tractor. Most farmers have small tractors and some type of cutting device. Some of the farmers in 2001 were using disc mowers and we achieved the same success in the cutting process. After cutting the kenaf, it is raked and windrowed using a standard hay rake.

I want to touch on a subject that probably most of you are not aware of, and that is called retting (see Figure 3). It is a very important process in producing kenaf. Retting, although it sounds a little bit like rotting, is actually the de-lignification of the crop. Lignins are the natural glues in nature, and you've got to break down the lignins to achieve separation of the two fibers, bast and core. You can tell when these crops are ready to be harvested—when it is properly retted—by going and picking it up and twisting it. If the bast fibers, which are the exterior, stringy fibers, separate from the core fibers pretty easily, then it is ready to be harvested. This process of retting can take anywhere from 30 to 60 days. It is primarily

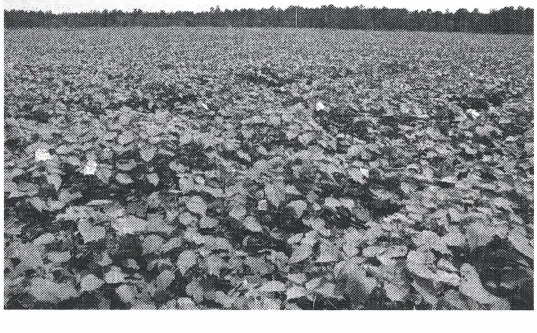

Figure 1. Successful kenaf stand in Greene County, NC with 18" to 24" plants – 7/6/2001

Figure 2. Cutting 6+ ton/acre kenaf crop in Greene County, NC – 9/25/2000

achieved through moisture, temperature and microbial activities. When you cut this crop, it is going to lie on the ground. If it rains on it, that is okay; that is just going to speed up the process of retting so you don't have to worry about the crop being damaged. Of course, if it lies in water for a month it will be damaged. But you do not have to worry about extensive rains damaging the fruit, because we are not producing the fruit here. We are not producing seed. We are simply producing fiber, not unlike tobacco. Everybody knows tobacco is pretty resistant to disease and drought. Kenaf is much the same way: you don't have to worry about going through a fruiting process, since all we're after is the stalk.

In general, farmers do not have to make any major investment in equipment to produce this crop. Most every farmer has a grain drill, a chisel plow, a disk harrow—they can plant it. It really does not require much effort to produce a crop. I met with Dr. Johnny Wynn a couple of years ago and I will never forget what he said. He sat down and said, "Guys, you can produce this crop with your eyes closed, but can you market it?" So the challenges of production are not too great. It can become a problem if you have to go out and purchase your own harvesting equipment. Figure 4 is an example of the harvesting process. This is practically the only specialized piece of equipment that you need in the production of kenaf. It can take a significant amount of capital to buy a tractor large enough to pull the baler, and the baler itself is imported equipment, costing around $65,000. But we view that as a service industry, much like a cotton harvester or grain harvester would be for some individuals.

In the year 2000 we got a gentleman out of Pennsylvania to come down with his baler. We did not have any in Greene County, and there were very few in North Carolina. But we perceived this piece of equipment to be the proper piece of equipment for the harvesting of the crop. You will note that this is a pretty big bale. The dimensions on that particular bale are 3 feet tall, 4 feet wide, and about 8 feet long. These bales will weigh around 700 pounds each. About 7 pounds per cubic foot is what we were shooting for in this bale. There are currently two balers owned by farmers in Greene County, and we have used these balers this year in the harvesting of the kenaf that was planted in the year 2001. You can also use round balers, and we have actually done so. Some of our 2000 crop was harvested with a

Figure 3. Retting cut 6+ ton/acre kenaf crop in Greene County, NC – 10/20/2000

Figure 4. Baling windrowed and dried, fully retted kenaf crop in Greene County, NC – 11/20/2000

round baler. But it's tough—the crop is so coarse, that it is difficult to begin that process of wrapping when starting the first part of the bale. Also, in the storage of kenaf, you can store 60% more in square bales than you can in round bales. The density on a round bale is around five pounds per cubic foot; the density on a square bale is around seven pounds per cubic foot and you can put a whole lot more squares in there than you can circles. After the crop is baled, it is then loaded on trailers and trucks, using forklifts or skid steer loaders. It is then shipped to the warehouse for storage. This particular facility (see Figure 5) is located in Greene County, and it is around 60,000 square feet, more or less. This building is owned by Ham Farms; we are leasing some space from them to store crops prior to building our own storage facility.

Figure 6 provides an example of the kenaf farm budget. Of course, you have nematicide and you notice that I have got a question mark beside those nematicide costs. This crop is very susceptible to nematodes, but if you do not have a nematode problem, then you do not have to treat for it. The best way to determine whether you have a nematode level that requires using a soil fumigant is to submit the soil for central testing. The method for controlling the nematodes in kenaf is to do a nematode assay, and I am sure many of you who are farmers in here know what I am talking about.

Lime is required to keep the soil ph at around 6.0, which is standard for soybeans, tobacco, and cotton production, and its cost is usually around $10 an acre. The nitrogen requirements are around 100 pounds per acre.

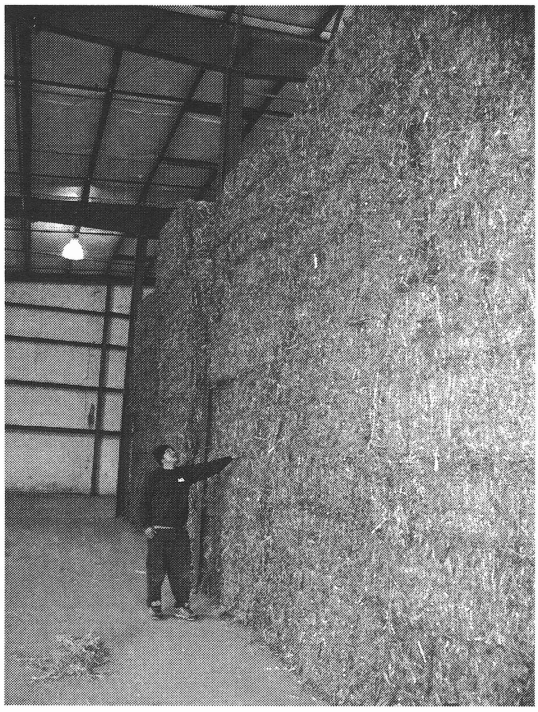

Figure 5. Bales of Greene County kenaf stored in Greene County, NC pending processing – 1/30/2001

Nematicide (?)	$100
Lime	$ 10
Nitrogen	$ 20
Potash	$ 20
Seeds	$ 35
Herbicide	$ 20
Fuel	$ 15
Repairs, etc.	$ 15
Labor	$ 15
Land	$ 50
Harvest	$ 75
Machinery, etc.	$ 25
Expenses	**$400**
Income: 10,000 @ .05/lb.	$500
Net Income	$100

Figure 6. Kenaf farm budget for Greene County, North Carolina (2001); use of nemticide is optional and, to date, has not been subscribed by any farmer. True annual kenaf production expenses are therefore estimated approximately $300

The cost of potash, at around 120 pounds, is $20 an acre; and seeds are around $35 per acre. You want to apply about 10 pounds per acre. You want a final stand of around 100,000 plants per acre. Herbicides—you can use fairly inexpensive herbicides in production, primarily prep land, soil incorporated. You can use spray over the top. If you have grass and weed problems, you can overcome them with post-applications using something such as Select for grass and Staple for broadleaf weeds.

Fuel is budgeted at $15 an acre, which is very generous for that category, then we get to repairs, labor, land, etc. The harvesting cost is pretty expensive—up there with the cost of the nematicides at around $75 an acre. That would probably be a process that is contracted out to people within the community who will own balers and perform the services of cutting, raking, baling, and removing the crop from the field. Machinery costs are estimated at approximately $25 an acre. Total expenses are around $400 acre. It is fairly capital intensive. Now, look at the income line down at the bottom. You have around 10,000 pounds, at a nickel a pound, which would return you $500 per acre gross. We perceive 10,000 pounds per acre to be the minimum production for the year 2000. We did not have a single test plot that yielded less than 10,000 pounds per acre. Some of the test plots yielded very close to 14,000. You can imagine, at a nickel a pound, if you produce a little bit more tonnage than 10,000 pounds, it will give you a little higher profit than net income of $100 an acre. Now we produced the crop so those farmers can make a profit on it. What are we going to do next?

In November of 2001 an S-corporation was formed. Sixteen investors got together and pledged capital and put up cash and we formed a company called Greene Natural Fibers. Greene Natural Fibers is currently in the process of building a manufacturing facility. We have received approval from the North Carolina Department of Environment and Natural Resources for the sedimentation and erosion control plan. We have our plans for the building and put the site work in the hands of contractors. We are currently waiting for them to reply and give us bids. We plan to start building our facility, which includes a 40,000 square foot manufacturing facility, this coming month. We are also going to build around 160,000 square feet of raw goods warehousing facilities—all of it located in Greene County. We already have a piece of land surveyed, of around 11 acres. If all goes according to plan, we plan to start processing in July. We are purchasing our equipment from a company in Germany by the name of TEMAFA. They have delivered 1/3 of the equipment and it is in a warehouse in Greene County—the same place where the raw materials are stored. We will start putting this in our facility upon completion of the construction. Engineers from Germany will spend about 60 days with us installing the equipment and also training personnel to work with it. We are going to employ around 30 people full time. We are going to run the facility 24 hours a day, seven days a week.

Now I will discuss some of the products we are going to be producing. There are two constituents of the plant: the first is the core material, which is a really fibrous, lightweight and highly absorptive material. You can see in

Figure 7. Value-added kenaf core fiber absorbent products—oil absorbent and horse bedding

Figure 7 that we are going to be producing animal bedding. This is an example of some that we had bagged and cleaned, and it came from what we sent to Canada from the 2000 crop. It is a very pretty product, and we have been sending some to Florida. A gentleman who works with us went to Florida a few weeks ago with 100 bags and set up a tent stall at the big horse show in Palm Beach, Florida. Since then we have been receiving phone calls and messages from people who tested the product, and they want to know when they can start buying it. We are going to send some to Gulfport, Mississippi next week for the same purposes, and we anticipate the same response from that market.

Figure 8 shows a stall of kenaf—a very pretty product, clean and white-looking. It looks good inside the stall. This product out-performs the current leading bedding material, wood shavings, which is our largest competitor. Our product is going to be competitive with the prices of existing popular products and, with respect to absorption, it is going to out-perform them on the level of about two to one. So we do not anticipate any problems entering the market. It can also be used for kitty litter—highly absorptive and with very high odor reducing characteristics. The reason for that is because when the kenaf core absorbs liquids, urine, etc., it goes to the interior part of the plant. It does not stay on the surface—on the outside—so it, therefore, masks the odor that normally comes from urine and other similar substances.

The second type of kenaf fiber is the bast, a stringy fiber on the exterior of the plant. The bast product will be used in the production of interior parts for cars. Figure 9 happens to be a current model Chrysler Sebring door panel. You cannot tell that there is any kenaf in it because what you see is a vinyl exterior—the surface you see when you're sitting inside the car. If you turn the panel around you can see that the kenaf bast fibers, which are blended with polypropylene on a fifty-fifty basis, are utilized. This product is replacing fiberglass, plastics and wood fibers. You wonder why they would start using kenaf fibers in the production of parts in an automobile. Well this trend started in Europe probably seven or eight years ago. There were mandates in the European Community to develop automobiles that are either biodegradable or recyclable. A certain percentage of those cars had to achieve that result by a specified dead-

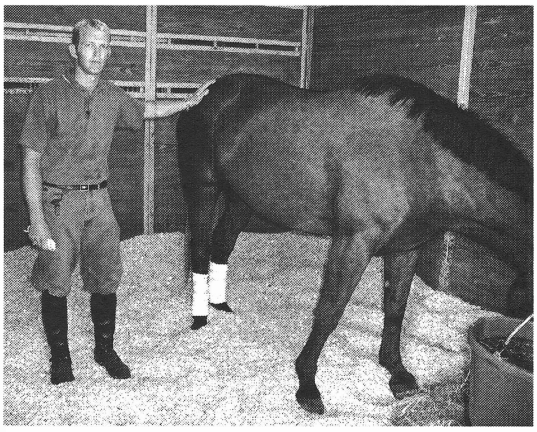

Figure 8. Kenaf premium horse bedding in use, Wellington, Florida 2/13/2002, owner: Mike Morrissey, COO, Stadium Jumping Corporation

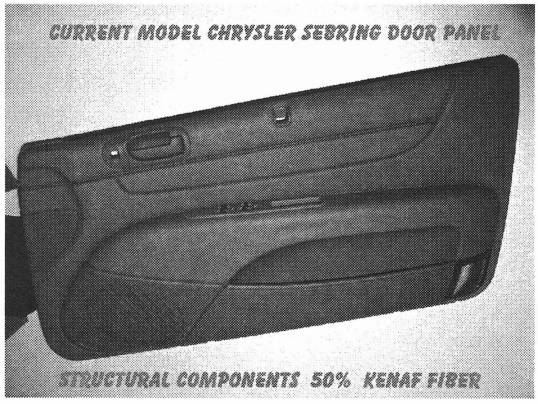

Figure 9. Automotive industry kenaf application: Chrysler door panel front

line. So, the automakers started utilizing natural fibers in the production of certain parts of the car. What they found out is that this is actually cheaper to produce than the current fiberglass method. Ultimately, it is a price issue. Automobile manufacturers could make more money selling a part with natural fibers used in it. It is also lighter, and is just as strong. It is also safer, because it doesn't crush and create shards. It crumples and does less bodily injury in a crash. These products have to go through extensive testing to be used in the manufacture of automobiles—you don't just start using natural fibers to produce a product; it takes several years to achieve this. At any rate, in Europe over the last four years, there has been a 700% increase in the use of these fibers in the production of automobile parts. We expect that trend to move here to the United States. There is currently less than 3% market penetration in the use of natural fibers in the production of parts for automobiles. Three-tenths of one percent—that is a very small amount. Can you imagine if we could achieve a level with 25%? Right now, these fibers are being imported primarily from Canada, Europe, and Asia. Our goal is to replace these imported fibers, and we have certainly had a lot of success lately working with manufacturers in achieving that.

Kenaf can also be used in the production of paper. We are not currently focusing on kenaf in the production of paper, because none of the current paper manufacturers in our area are interested extensively in the production of kenaf paper. There are several companies, however, currently producing kenaf paper. Another example is building products, which was our initial focus (see Figure 10). We determined after a period of time, however, that it would require too much capital. You are looking at anywhere from $15 to $100 million in investment in a facility to produce these types of boards, and you would be going into a market that's already saturated with products like this, and we don't want to go in and lose any money right at the start.

Now, what is going to happen with kenaf in Eastern North Carolina? In 2000 we had 25 acres. In 2001 we had 1700 acres and we completed the harvest of that crop and it is in storage as of today. Where do we go from here? Our manufacturing facility has the capability of processing 30 million pounds of fibers a year. That is approximately 3,000 acres at 10,000 pounds per acre. So we are going to plant 3,000 acres this coming year. We have the seed in inventory, enough to plant more than that. But right now we're focusing on 3,000 acres at this point. These acres will probably be planted in Greene and Pitt counties, and potentially some in surrounding counties. It is highly sensitive to freight costs because you're producing so much bulk freight, there is so much mass volume, and it requires a lot of transportation costs to get it to a processing facility. You cannot go far before the freight costs become prohibitive to the farmer. I would say we are limited to about a 15-mile radius currently. If production grows due to increased demand, we do anticipate expanding into other areas, kind of like cotton gins. You set up a production area around the processing facility.

Long-term, there are a lot of studies out there indicating that the use of natural fibers in automobile manufacturing—also in building materi-

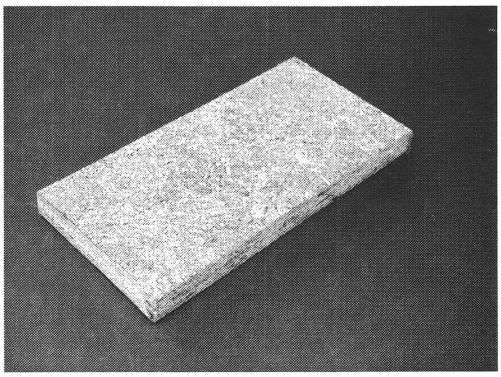

Figure 10. Greene County manufactured kenaf lumber product.

als and other products—is going to grow exponentially. Demand for our products is continuing to grow and we will, accordingly, continue to expand acreage as well as production and processing capacity (see Figure 11). We look forward to doing so. The same trend is continuing in Europe. I was on the phone with a gentleman last week, who is a major importer of hemp fibers for industrial applications. He is concerned that there is a severe shortage of bast fibers in Europe at the moment, because fiber consumption in Europe has expanded so rapidly in the use of industrial applications and building components. We anticipate the same thing happening in the United States. I appreciate everybody's time, and thank you for having me today.

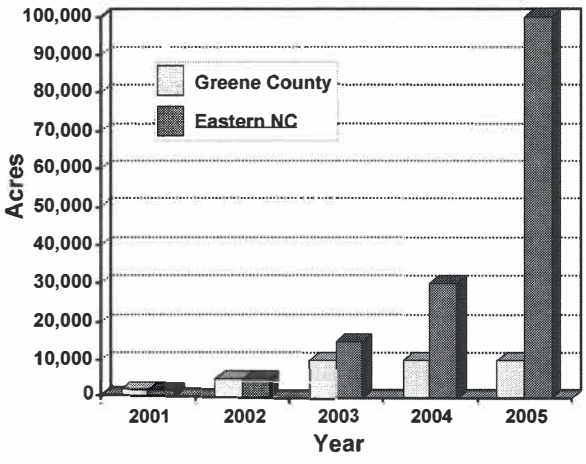

Figure 11. Projected North Carolina kenaf acreage