

Commentary

Kenaf: A New Farmer-Driven Solution to Eastern Carolina's Agricultural Crisis

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North Carolina agriculture, once leading the nation in returns per planted acre, and third only to California and Texas in net farm income (North Carolina Rural Economic Development Center 2000), has been hard hit in recent years. Tobacco allotments, which underpin the entire system, have been cut in half. Increasing globalization and significant US commodity market exposure to foreign producers have brought commodity grain prices to historically low levels — with no relief in sight. Massive consolidation of packaging and processing capacity has also siphoned poultry, livestock and vegetable revenues away from the grower to the benefit of the agri-business overlords. The family farm, in particular, has been caught in the middle of the squeeze. Increasingly, farmers acting on the stern advice of their bankers are following the only course of action available to them — getting out of farming while they still have some asset value left.

This paper examines the efforts of a small, yet determined group of Eastern North Carolina family farmers who have decided they wish to remain as farmers. It is a bleak landscape, US agriculture, from within which this group is searching for solutions. They know there are no easy answers nor simple solutions. Still, resolved to *be* farmers and not be “retrained” as something they wish not to become, they have determined that they *will* solve their own problems.

The Farmers' Dilemma

It is instructive to put some numbers to the farmers' dilemma. This year tobacco brought an average

of 178 cents per lb at auction. Farmers pay an average of 50 cents per lb to lease allotments. With the increase in fuel, fertilizer, fumigant, pesticide and herbicide prices, the average cost of producing and curing a pound of tobacco leaf has risen to around 105 cents (including land rental) — up from just 65 cents six years ago (Farmer Interviews, 2000). That gives farmers a net return of 23 cents per lb on the average year 2000 production quota of 2,000 lbs per acre (Personal Communication, Farm Service Agency, 2000) — or \$460 per acre, less than half their net return per acre just six years ago. With the average tobacco farmer now controlling approximately 40 acres of allotments, farm-derived income for a tobacco farmer averages around \$18,400. This is around a quarter of the average income of a United Auto Workers Union member (United Auto Workers Union, 2000). Taking into account the effects of inflation and a 31% loss in the purchasing power of the dollar during the decade of the 1990s (US Bureau of Labor Statistics, 2000), it is also less than one fifth of the real income a tobacco farmer made less than a decade ago. While farmers rotate tobacco with corn and soybeans, those two crops are, this year, expected to net the farmer zero — even with government subsidy payments.

Farm acreage in Eastern North Carolina is now distributed, approximately, among the following crops: 6% tobacco, 28% cotton; 36% soybeans, 13% corn and 17% other crops — including wheat, hay and grass crops, fallow and vegetables (Farm Service Agency, 2000).¹ Cotton this year is enjoying its best

year in a decade — a “best case” year resulting from a favorable convergence of “somewhat” attractive world prices and excellent local weather. Farmers are expected to net between \$100 and \$125 on their cotton acreage this year. The hypothetical “average” 500-acre Eastern North Carolina family farm occupies land worth over \$1 million, owns around \$300,000 in equipment and borrows around \$275,000 in working capital. The farmer can expect to net the following income on his statistically balanced acreage: tobacco (30 acres) \$13,800; cotton (140 acres) \$15,750; corn and soybeans (245 acres) \$0; other crops and fallow (85 acres) \$0. With his approximately \$30,000 in pretax income, the statistical farmer makes 25% less than his wife who works as a school teacher (15 years seniority) for the county. If one combines the \$25,000 the farmer pays as rent on his tillable acreage with his own \$30,000 income and subtracts the tax assessment on land (\$10,000) paid by the landlord we arrive at net annual “value derived” from farming 500 acres of \$45,000. This is equal to a return of approximately 3.5% on asset value (Farmer Interviews, 2000). These returns, which are subject to significant weather and market-related risks, are effectively the worst of any sector of the US economy.

Poultry and swine were, at one time identified as an escape route for the average dirt farmer. Today, approximately 13% of Eastern North Carolina farmers own either poultry or swine finishing facilities (Farm Service Agency, 2000; Farmer Interviews, 2000). A turkey farmer who committed to a 6-house turkey farm seven years ago can today claim a partially depre-

ciated, fully-paid-for \$600,000 asset and expect to net around \$80,000 finishing birds for his “integrator.” Similarly, a swine farmer who committed to a new 4-house swine finishing facility seven years ago can claim a partially depreciated, fully-paid-for \$400,000 asset and expect to net around \$40,000 (Farmer Interviews, 2000). The rosy picture ends there, however. There is, effectively, zero growth in both the poultry and swine finishing businesses. The swine equation is particu-

larly disturbing. Attractive 7-year “contracts” with integrators have been replaced by “agreements” that now pay only \$9.50 per finished hog (with incentives), perhaps 5% less than they did seven years ago, with cost of inputs having increased by as much as 25%. This reduction in real income, combined with expectations of a requirement to spend between \$100,000 and \$250,000 on new waste treatment technology, promise to bring income from swine finishing to a par with other farm crops (Personal Communication, Department of Environment and Natural Resources, 2000; Farmer Interviews 2000). The circumstance in the swine industry, in particular, is



Figure 1. Kenaf Leaf- Everglades Strain

governed by a massive consolidation at the integrator and processing levels. A single entity now controls over 50% of North Carolina’s swine production and over 85% of its processing capacity. By “setting” the market price of finished hogs slightly below breakeven, this same company can bleed at will all the equity from its competing integrators. As integrators gradually succumb, the market value of affiliated farmer-owned finishing facilities will also decline. Farmers will eventually be faced with the choice of selling out to the

prevailing integrator-processor for a significant discount, or walking away from a worthless asset which that same integrator may, in any case, buy at auction (Farmer Interviews, 2000).

This dismal farming circumstance has, not unexpectedly, begun to attract significant attention from among North Carolina's politicians and its media. Governor Hunt convened a state Rural Prosperity Task Force with a mandate to develop solutions for generating in North Carolina's rural communities the extraordinary prosperity enjoyed by its urban residents during the last decade. The Task Force recommendations, while thoughtful and enlightened with respect to information technology, training, capital formation and infrastructure issues, were notable for their failure to provide any specific solutions for North Carolina agriculture beyond the obvious recommendations for investments in enhanced coordination, marketing, processing and research on "transgenic" crops. Perhaps more ominous for small, family farmers was the report's acknowledgment that "more and more small farmers are getting out [of agriculture]"; and "we've lost 150,000 farms." The report goes on to state that "the average size of farms has been increasing"; and "8% of North Carolina's farms produce 73% of the state's farm income." Indeed, accepting that "...this change is inevitable" the only real tangible assistance offered by the report's authors to the small farmer is "to help those farmers transitioning out of the business by using the retraining programs we are recommending in our education section." The report does not anticipate any developments in agriculture that might have a wide impact on the state's remaining farmers. It speaks vaguely of "biocuticals" and "nutraceuticals" as products that "typically represent niche markets, but can be highly profitable in small quantities." (Rural Prosperity Task Force Report, 2000)

The Farmers' Approach to a Solution

A group of small, family farmers based in the 5-county area bordered by Greenville, Wilson, Goldsboro and Kinston in Eastern North Carolina having decided not to accept the "inevitable," took it upon themselves to change the prevalent paradigm

— to develop a means by which they might not only remain in agriculture, but also to thrive. It is not their intention, as suggested by the Rural Prosperity Task Force Report, to submit themselves to "retraining" at the nearest Community College. They are farmers. They enjoy being farmers, and they intend to remain so.

In their analysis of the problem facing them, the farmer group arrived at some simple first round conclusions:

❖ No purpose was served spending any time on working to improve the circumstance with existing crops. No "new markets," "byproducts" or "biocuticals" derived from those crops, nor any amount of transgenic engineering of those crops would or could favorably affect the farmer in the near term. The mechanisms to extract, away from farmers, all the residual value in those crops were already cast in stone. Discovery of a nutraceutical derived from corn or a new polymer from soybeans would, for instance, have absolutely no impact on local farmers' income. Any such development could have no practical impact on any aspect of the massive global market for corn. It would still be less expensive to import corn from Iowa. Any increase in value derived from the "discovery" would contribute entirely to the the scientist, the manufacturer and his agents.

❖ No purpose was served going after niche markets. It was their intention to deliver a solution that could benefit hundreds of farmers tending tens of thousands of acres. Niche markets might serve one, or perhaps a handful of farmers who separated themselves from the pack, but they were not a "general solution."

❖ They needed a crop for which a huge potential market existed. Further, they should have a natural comparative advantage in growing and/or marketing that crop — preferably both.

❖ Mindful of the "environmental bad boy" label applied to the swine and poultry industries, they wanted a crop that was "environmentally friendly."

❖ Finally, they needed a crop they could deploy immediately. They could not wait another decade while scientists engineered the perfect rhubarb or turnip. Their livelihoods — their lives were in the

balance *now*. The bankers had already delivered their verdict on local agriculture. “We were forgiving this year because of the flood and pressure of public opinion, but next year, if the numbers on your business/cropping plans don’t add up, we’re going to pull the plug.” (Banker Interviews 2000)

❖ The farmers also recognized that introduction of a new crop allowed them the opportunity to control the crop from the outset — to ensure that they did not yet again become passive victims of the processors, reproducers and marketers of the products they grew. The lesson of the penny worth of corn in a two dollar box of corn flakes was burned into their collective psyche. They must take this new crop all the way to the consumer. They wanted their share of the \$1.99 added to their penny worth of corn.

Kenaf — A New Crop for Eastern North Carolina

The farmers found their crop — kenaf. Closely related to both cotton and okra, kenaf was ideally suited to Eastern North Carolina’s unique soil and climatic conditions. As with cotton, Eastern North Carolina’s greater rainfall and high humidity allowed the state a distinct advantage over Georgia, Mississippi, Arizona, south Texas, Oklahoma and Alabama — both for growing the crop and retting it — the first morning dew-dependant stage of processing. Better yet, demand for the unique “bast” and “core” fibers produced by the plant was exploding in Europe and on the verge of an explosion in the US. Timing for introducing kenaf into high volume production in North Carolina was excellent.

From a global perspective kenaf is not a new crop. It falls within a loose grouping of “bast fiber” crops known to the twine and textile industries as “jute-like” fibers. This group, which includes jute, roselle, sunnhemp, hemp and kenaf have historically been grown for the long fibers in the plants’ outer bark. Before the plastics industry came along these competed with the cactus-derived henequen and sisal for supremacy in the twine and rope markets. A hibiscus species traced to Africa, kenaf, or “poor man’s jute,” was grown primarily in India as a jute-substitute more suited to dryer and less fertile soils. Jute

always dominated kenaf in the Subcontinent, and it continues to do so today.

Disruption by German and Japanese U-boats of bast fiber shipments to the US during World War II prompted the US Department of Agriculture to launch a small kenaf R&D program in south Texas. Hemp was, at that time, selected as the fiber of choice to compensate for jute and manila (hemp) shipment losses. Production of that fiber, particularly in Kentucky, reached significant tonnage by the end of the war, with remarkable progress having been made in developing strains optimized to US climatic conditions. Following World War II, however, confusion of industrial hemp with its narcotic cousin, combined with strong competition from the plastics industry ultimately doomed the crop. Sadly, all the valuable germplasm of optimized strains was destroyed. Unaffected by the excitement surrounding hemp, research on kenaf, which never entered serious pro-



Figure 2. First Kenaf in North Carolina

duction in the US during World War II, continued forward, unnoticed, under the guidance of a small handful of dedicated USDA researchers.

Due in large part to the fifty years of research contributed by the USDA South Texas laboratory, and more recently by plant breeders at the Mississippi State University, Kenaf has suddenly gained prominence as a highly competitive fiber crop ideally suited to the southern US, and North Carolina in particular. New varieties and strains identified by these two research programs have been shown capable of producing, under ideal conditions, more than 10 tons per acre of total fiber — both bast and the light-weight core material. This high productivity exceeds, by a factor of 4, the highest productivity of the latest “synthetic forest” pine species. Further, kenaf has been shown to be an excellent — typically superior — substitute for tree-derived fiber in most applications such as paper, panelboard, plastic fillers and reinforcers, engineered lumbers, insulators and absorbents. The long bast fiber has 4 times the stiffness and tensile strength of wood fibers and the light-weight core fiber is at once lighter, more adsorbent (by a factor of 4), and a better insulator than comparable wood shavings.

In production of paper, kenaf holds two distinct advantages over wood fiber. A significantly lower lignin content makes pulping of the fiber less costly — with respect to energy (electricity and fuel), chemical use and time. A “37% cost advantage” in optimized pulping is typically cited by most kenaf advocates (Mardon and Lehmer 1997). Further, being a less pigmented fiber than wood, kenaf pulp can be brought to an acceptable color (bleached) without the need for expensive, environmentally hostile chemicals such as chlorine. Benign peroxide bleach produces an acceptable product.



Figure 3. Greene County Kenaf Harvest - October, 2000

The unique absorptive characteristics of kenaf bast have rendered it indispensable in the kenaf, hemp and flax blends now employed in manufacture of reinforced polypropylene automobile panels. Those same properties, combined with kenaf's vastly superior strength allow manufacture of a high strength panelboard and/or engineered lumber products having the added advantage of being rendered completely fire retardant (through rapid absorption of borates added during manufacturing).

Kenaf core fiber, typically between 60% and 70% of the total plant by weight, provides an excellent performance in the removal of oil from water.² These same absorptive characteristics render it a highly effective replacement for sphagnum moss in high-end potting soils and a superior substitute for wood shavings in animal and poultry bedding and clay in oil cleanup products. Kenaf core also provides an effective low cost replacement for synthetics in the manufacture of lightweight insulating and sound dampening panels and ceiling tiles. As a replacement for talc and calcium carbonate in injectable and extrudable plastic compounds it adds stiffness while also reducing weight and cost.

From the farmers' perspective, Kenaf provides a profitable fixed-price, contracted agricultural alternative to commodity crops in an era of historic low prices. It is a relatively low-input, robust annual crop

capable of producing more than 3-times the equivalent fiber yields of the latest generation of high yielding softwood “false forest” plantations. Kenaf provides exceedingly quick planting-to-payment turnaround for a fiber crop — less than 7 months in most instances, compared to 5 years for bamboo and more than 8 for the latest generation of conifers. Kenaf can be planted and cultivated with conventional equipment — allowing farmers to commence production without incurring a major capital investment.

In North Carolina, kenaf production is expected to average around 5 tons per acre per year. Production and harvesting costs, excluding land, should average between \$250 and \$350, depending on local conditions. With farmers receiving 4¢ — 6¢ per lb for whole fiber, net returns to the farmer should average between \$250 and \$350 per acre. This compares favorably with any of the commodity crops now being grown by Eastern North Carolina farmers and even begins to approach returns now being realized in local production of tobacco.

Most importantly, the markets in which kenaf can be sold transcend the typical limitations of “niche” markets. Kenaf holds potential to compete with cotton locally with respect to farmed acreage. Demand from the automotive market alone is expected to reach 100,000 acres within the next five years. A single large pulping plant would require more than 100,000 acres of kenaf. Were the kenaf industry to capture only 1% of the \$40 billion US market for building materials it would take over 400,000 acres of farmed kenaf to satisfy that demand.

The principal environmental benefits conveyed by cultivation of kenaf derive from its replacement of wood. Assuming a 5-to-1 growth advantage (over conventional growth forests), five acres of farmed kenaf will, each year, protect an acre of trees that might otherwise be clear cut and then replaced with biologically sterile, rapid-growth “false forest” pine plantations.³ This affords two distinct advantages: it preserves the state’s biodiversity and it shifts the state’s fiber burden from its fragile forests to the shoulders of its threatened farmers, who welcome that responsibility. A kenaf-fiber strategy at once sustains both forests and farmers, while also preserving threatened plant and animal species of North Carolina.

Having now selected their candidate for turning around agriculture in Eastern North Carolina, the “kenaf” farmer group is embarked on a mission to achieve their objective. In 9 discrete plots — 25 acres in total — positioned strategically throughout Greene County, the farmers have demonstrated the feasibility of growing kenaf in Eastern North Carolina. By varying key planting and harvesting parameters they have also demonstrated the full range of plant production and harvesting paradigms. Interest by local farmers has been intense. In the 2001 growing season, the group intends to demonstrate the feasibility of “significant” production of the crop in Eastern North Carolina. Approximately 50 farmers located in the 5-county project area will cultivate 6,000 acres of pre-sold kenaf. This kenaf will be “dew-retted” in the field, round-baled for centralized storage and decorticated (fibers separated) in a farmer-owned facility installed as the “flag ship” of a new Greene County industrial park. The resulting 9,000 tons of retted, cleaned and baled bast fiber will be employed by the automotive industry in production of automotive door panels, headliners, rear window shelving and trunk liners. Kenaf will, in most instances, be replacing glass fiber reinforcing which is conventionally employed in manufacture of these same interior panels. The 21,000 tons of core material produced by the kenaf farmers will be employed in bulk as horse bedding and potting soil additive and packaged in a variety of configurations as oil absorbent and animal litter.

Having thus demonstrated the viability of farming several thousand acres of kenaf in Eastern North Carolina, the farmers intend then to move on to the third and final phase of their plan — installation of a factory to manufacture engineered building materials employing varying percentages of both bast and core. These building materials would compete across the entire range of building products, but concentrate heavily on integrated products requiring high strength, stiffness, dimensional stability, and insulating properties. I-beams, joists and structural insulated panels would number among the most important applications. The factory would process kenaf grown by approximately 300 farmers on 20,000 acres and supply less than one twentieth of one percent of the US

demand for building materials. The manufacturing facility will provide between 200 and 300 rural jobs in economically depressed Greene County. Providing market acceptance of the kenaf-based building materials was satisfactory, the same 20,000 acre model could be replicated in a dozen or more locations throughout Eastern North Carolina.

The Farmers' Solution: Producer Controlled "Bottom-up" Vertically Integrated Farming

The kenaf farmers are guided in their pursuit by a number of self-imposed operating rules and guiding principles. Taken as a whole, these rules and principles become a unique "model" for reforming agriculture in Eastern North Carolina:

- ❖ For the farmer, "bottom-up," directly linked value-added processing and direct market access for finished products is essential — an absolute necessity.

- ❖ Achieving equity ownership and control over value-added processing and direct market access by farmers is feasible, but only for a new crop — preferably "new" in an absolute sense (such as kenaf), but certainly, at a minimum "new to the area."

- ❖ Farmers must coordinate with one another to achieve strict farmer-control over production acreage.

- ❖ Farmers must only deliver their commodity to the market place as a value-added product. They must eschew the "commodity business."

- ❖ Capturing the middle ground between the farmer and the final consumer — for absolutely any farm-grown product — is immensely profitable. Witness the 2 cents worth of farmer's grain that goes into a \$2 box of Ritz crackers. Farmer's need not hand this 100%+ profitability over to intermediaries, corporate processors and investors. Investors need only receive a "comfortable" 20% to 30% return. As the true controlling interest, farmers may reserve most of the value-added profitability for themselves.

- ❖ Farmers have enormous political strength if they can: (a) agree on a common agenda; (b) stand up and be seen as a group; and (c) speak with strength and absolute conviction. They must not request so-



Figure 4. Kenaf Farmers Surveying First Crop, August 2000

lutions. They must "know" the solutions and mandate implementation of those solutions.

- ❖ Public opinion strongly favors the family farmer. This goodwill is greatly enhanced if the farmer is allied with a popular environmental cause, such as, in the kenaf instance, *preservation of our precious forest resources*. Public opinion weighs heavily in the political equation.

- ❖ Massive state and federal resources are spent to assist and subsidize the income of the farmer. The true value of these public sector investments is all drained off by monopolists and farm-exploitation interests. The "system" as it now exists is powerless to prevent this. Logically, both state and federal politicians must, therefore, see the virtue of making modest (by total agricultural subsidy standards) investments directly with farmers — invest-

ments that will allow farmers, once and for all, to escape the trap in which they are now caught. Ultimately, liberating and empowering farmers in this manner will be much less expensive to state and federal coffers than continuing to pour billions of dollars directly into the pockets of prominent agribusiness corporations in a largely fruitless effort to maintain farmers' heads above the waterline. A "health sector" analogue is instructive: It cost less to eliminate, completely, the smallpox virus than the sum total all the world's nations spent each year on their domestic vaccination programs.

❖ Achieving complete financing of a major, environmentally friendly, farmer-driven vertically-integrated agricultural enterprise from a combination of public and private sources, while also maintaining absolute control, is a feasible task.

Today, only 8 months after embarking on their odyssey, the kenaf farmers of Eastern North Carolina, have succeeded in attracting the interest and support of their state legislators, county-level officials, the state's major universities and — most importantly, their peers. They have also attracted the attention of the market place. In the coming year they are being asked to supply 6,000 tons of Carolina-grown pure bast fiber for the manufacture of automotive interior parts. This is a small, yet significant beginning for what can grow to become one of the most important crops in North Carolina while providing a solution to the fundamental problems now confronting Eastern North Carolina's farmers.

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¹ These cropping figures relate specifically to the 5-county Phase-I kenaf project area (Wayne, Greene, Lenoir, Pitt and Wilson counties) and should not be generalized to all of Eastern North Carolina.

² Where this is particularly useful is in cleaning up after large oil spills on open bodies of water. It can also be used to separate the oil from water at drilling sites, allowing subsequent conventional "treatment" of the water.

³ Five acres of kenaf will produce approximately the same tonnage of ligno-cellulosic fiber in one year as one acre of felled, 25-year growth trees. One acre of kenaf will, therefore, produce five times the total tonnage (on an annual basis) of one acre planted with trees.