

Tech cotton technology could prove useful in Gulf oil cleanup

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Texas Tech's Seshadri Ramkumar has created a cotton-carbon fabric that may be used in the cleaning efforts of the April 2010 British Petroleum oil spill in the Gulf of Mexico.

Ramkumar is an associate professor for the Texas Tech Institute of Environmental and Human Health and has a doctorate in materials, textiles and fiber-sciences. In April of 2009 he patented Fibertect, a nonwoven cotton material combined with an activated carbon fabric that can be used for oil absorption and hydrocarbon vapor retention.

Although Ramkumar holds the patent, he said he and his graduate students are not the only people working on this technology.

"Many people, even at TTU, are working on cotton booms for oil absorbency," Ramkumar said. "But Texas Tech University's patented Fibertect technology with cotton-carbon is unique to TTU."

Ramkumar said the reason so much research has been done on raw cotton to clean oil is that it has the ability to hold 30 to 40 times its weight in oil.

Roger Haldenby, vice president of operations for Plains Cotton Growers, said Ramkumar's advancement in research has opened new doors in the cotton industry because there had previously been only a small demand for the type of cotton used in this technology.

"Some of the cotton we grow is low-maturity, it's called low-micronaire," said Haldenby, "and all that means is that the cellulose, the little fiber strands of cotton, haven't matured as much as they are needed to make good, strong yarn and thread."

Haldenby said these immature strands of cotton are hollow in the middle, allowing them to absorb more oil than mature cotton.

"A very immature fiber is like a tube," said Haldenby. "So imagine this little tube, if you put water or oil or something like that in there it's actually able to absorb it into to the inside of the fiber. So, low-micronaire, immature fibers are very good for this."

Russell Lepard is part owner of Lepard Family Partnership, which produces five to six thousand barrels of cotton per year. He said West Texas is one of the highest producers of low-micronaire cotton because of the warm, dry climate.

"The High Plains of Texas is the largest contiguous cotton growing area in the world," said Lepard, "and because of our weather there is a lot of low-micronaire cotton produced here."

What makes Fibertect different from other cotton absorption technologies, however, is its combination with carbon. It is a three-layer design consisting of a top and bottom layer of cotton to absorb oil and a middle layer of carbon that absorbs hydrocarbons and harmful carcinogenic vapors released from the oil.

Ramkumar said his unique use of activated carbon fabric in oil clean-up is extremely beneficial because the toxic vapors could potentially destroy ecosystems and cause cancer in humans if they are not absorbed.

Ramkumar said he and other researchers are simply taking what nature provides and applying it in new ways.

"Mother Nature has given cotton wax to protect it," said Ramkumar. "The natural wax on the cotton helps to hold the oil together. So, wax has affinity towards oil, and then the carbon has affinity towards vapor, it holds the vapor."



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SESHADRI RAMKUMAR, AN associate professor for The Texas Tech Institute of Environmental and Human Health, demonstrates Fibertect's ability to absorb and retain 30 to 40 times its weight in oil.

Because Fibertect is all-natural, unlike synthetic plastic booms previously used to clean oil spills, it is 100 percent biodegradable and one sheet can be wrung and reused up to five times.

According to www.propublica.org, the only cleaning method currently being used by BP is dispersants, which is an aerial spraying technique. The dispersant most commonly being used is Corexit EC9500A, which the Environmental Protection Agency has shown to be more toxic and less effective than other methods.

Ramkumar said the problem with Corexit EC9500A, besides the fact that it itself is toxic, is that it simply breaks down the oil into tiny particles which remain in the water and can be harmful to marine life and humans. He said Fibertect eliminates this problem because it absorbs the oil rather than break it down.

Samples of Fibertect have been sent to be BP but no decision has been made on whether or not to use it. Haldenby and Ramkumar said if they do decide to use it, this could be a big step towards a National Research University status for Texas Tech.



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