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Alternative sources of rubber have arrived

By Miles Moore

HILTON HEAD, S.C.—Alternative sources of rubber are no longer in the realm of speculation, but now are viable technologies for tire manufacturing, according to speakers at the Clemson University Global Tire Industry Conference in Hilton Head April 19-21.

Taraxacum kok-saghyz, more commonly called TKS or Russian dandelions, is often spoken of as an experimental source of natural rubber, but in fact it has been cultivated for close to a century, according to Daniel Swiger, president and CEO of Kultevat Inc.

"We need a domestic source of natural rubber," Swiger said. "TKS is a very good, high-molecular-weight rubber."

NR is so important that the world can't afford to limit its production to one plant in one part of the world, according to Swiger. "One of these days, leaf blight is going to hit Hevea," he said. "Some believe it, some don't. I think it probably will hit in some point in time."

TKS was part of Thomas Edison's research into alternative sources of natural rubber, which also included guayule, goldenrod and milkweed, according to Swiger. In the 1930s, the Soviets began extensive research and development into TKS, which originated in Kazakhstan and Uzbekistan, he said.

TKS and guayule were both the subject of intense research during the Emergency Rubber Project of World War II, Swiger said. Some 25,000 acres of guayule in the Southwest and 7,000 acres of TKS throughout the rest of the U.S. were cultivated during that time, he said.

Today, St. Louis-based Kultevat is poised to offer high-quality TKS rubber in commercial amounts, according to Swiger. The company now is growing TKS in 42 states, and has both a patented NR extraction process and a capital-efficient, bolt-on manufacturing plan, he said.

"We've done everything we can to increase biomass and yield," Swiger said. Kultevat has an ongoing partnership with KeyGene, a vegetable seed research and development firm whose clients account for more than 30 percent of global vegetable seed production, he said.


MILES MOORE, RUBBER & PLASTICS NEWS

Kedar Murthy

The partnership between Kultevat and KeyGene is important in two ways, according to Swiger. It coordinates the efforts of both companies to accelerate development of commercially viable TKS varieties, and also to commercialize the best germplasm and genetics for bulk rubber production, he said.

KeyGene bred TKS with another plant, TKO, to increase rubber yield, according to Swiger. "We're moving into where we have hybrids," he said. "Nobody else has that."

Some Kultevat germplasms have had rubber yields above 10 percent, with one germplasm producing as high as 22 percent, according to Swiger.

Kultevat also partners with the Donald Danforth Plant Science Center, which has some 1,700 Ph.Ds in agricultural science on staff, according to Swiger. The center has state-of-the-art technology, as well as greenhouses that provide artificial rain and sunshine, he said.

"At the Danforth Center, we can simulate on the inside what we proved on the outside," Swiger said. Kultevat has signed an R&D agreement with Sumitomo Rubber Industries Ltd. for TKS development, according to Swiger. He noted other TKS and guayule R&D programs and partnerships, especially that of Continental A.G. in Germany.

"We're seven to 10 years ahead of everyone else," he said.

Currently, Kultevat is in the fundraising phase for a TKS processing plant it plans to build in southwestern Missouri, probably in 2018, Swiger said.

In use for years

Whereas some alternative rubber sources are on the verge of commercialization, others have been used in tires for years, according to Kedar Murthy, vice president and general manager of Atlanta-based Lehigh Technologies Inc.

"What some people call crumb rubber, we call micronized rubber powders," Murthy said.

Micronized rubber powders are what Murthy called "a second chemical revolution—doing something with the waste we've created."

MRPs are an old industry as far as recycling goes, around for the last 30 years, according to Murthy. "But we've take a different approach," he said.

Boasting the unique "Cryo Turbo-Mill" micronizing technique it acquired in 2006, Lehigh has an annual capacity of 60,000 metric tons of MRPs at its six production lines in Atlanta, ranging from 20 to 200 mesh, according to Murthy.

Lehigh has the only R&D center dedicated to MRP chemistry and development, and six of the world's 10 largest tire makers use Lehigh MRPs, Murthy said. More than 450 million tires worldwide have been manufactured using Lehigh MRPs, he said.

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Daniel Swiger

Nearly 40 percent of Lehigh's revenue is in non-tire products, such as plastics, asphalt, construction and oil field products, Murthy said.

"In the past two to five years, there has been fairly broad adoption of MRPs at 5 to 7 percent," he said.

At the current state of development, Lehigh MRPs can comprise 5 percent of a tire comfortably, or at 10 percent allowing for considerable adjustment of the compound.

"As you use more, you get more cost savings," he said. He showed a chart demonstrating that a facility manufacturing 10 million tires annually and using 5 percent Lehigh MRPs can save more than $2.7 million annually.

Changing mindsets

The big change in the tire market today is that tire makers are developing protocols for optimizing the use of recycled materials, up to 10 percent per tire, according to Murthy.

There was a fear of using recycled materials in new tires, Murthy said. But things such as Bridgestone using the Ecopia brand name for its line of low-rolling-resistance tires are symbolic of shifting attitudes, he said.

"Things are starting to change, but very slowly," he said.

R&D or business leadership, corporate sustainability goals and a commitment to sustainable technology are all necessary to accelerate the adoption of recycled materials in tires, according to Murthy.

However, just about every major tire maker is making these efforts, he said. Some of the fruits of these efforts include Yokohama doubling its use of recycled materials between 2008 and 2016, or Sumitomo introducing its new, eco-friendly Enasave tires, which the company claims are made entirely without fossil resources.

MRPs now are common ingredients in new tire development and high-performance tire manufacturing, and the MRP supply chain is well-established, according to Murthy.

"Expanding the use of MRP or any new material requires continued development of technology and supply chains globally," he said. "Creating a supply chain for any new material requires a mindset change by the tire company."