

## GUAYULE



Guayule (why-YOU-lee) is a woody plant that thrives in the deserts of the U.S. Southwest and Mexico. New clean technologies make it possible to extract natural rubber, latex, ethanol, non-toxic adhesives and other specialty chemicals from guayule.

Guayule acreage in Yuma is small, and ranges from 50 to about 100 acres.

Guayule is a renewable, low-water use industrial crop. Products from guayule are made using non-polluting, water-based processes that require no toxic chemicals. Guayule-based products are also biodegradable, high-performing substitutes for many synthetic, petroleum-based products that are often expensive to dispose of and hazardous to the environment.

The first commercial product made from guayule is latex, natural rubber latex that is safe for people who are sensitized or allergic to natural latex from tropical sources.

Guayule (*Parthenium argentatum*) is a relatively new commercial crop and the only species other than the Brazilian rubber tree (*Hevea brasiliensis*) that has been used for latex production on a commercial scale.

Guayule is the only source of natural rubber latex free of tropical proteins. The Yulex Corporation has the exclusive license to a patented process to produce latex and products from Guayule. One patent covers a novel method for extracting and manufacturing Guayule natural rubber latex. The second patent covers rubber products made from such novel methods.

Extracting latex from Guayule involves homogenizing the entire hedged Guayule plant. Rubber is found primarily in the bark and must be released in the processing. Branches are ground into a kind of "Guayule milkshake" by gently breaking open the cells in the plant, releasing intact rubber particles and creating an aqueous suspension which is placed in a centrifuge for separation. Since the Guayule rubber particles are lighter than the aqueous solution, they are separated from the suspension. The rubber portion of the mixture is culled off the top (much the same way that cream is skimmed off milk) and purified into latex.

Traditional latex is tapped from ducts, which are found in a layer immediately outside the cambium of the Hevea tree. The tapper shaves off a portion of the intact section of the bark and then cuts into this layer making certain not to damage the cambium, since that is where the growth of the tree takes place. The latex then flows and is captured in a cup placed below the cut.

Guayule is free from the tropical allergenic proteins contained in tropical latex and contains less than 2% of its overall protein content. Further, Guayule latex proteins are different than those in found in tropical latex. Clinical data suggests Guayule latex contains no "super sensitizing" proteins like those in tropical latex. Therefore, products made from Guayule latex will not trigger latex allergy symptoms in sensitized individuals.

Guayule derived latex also meets the category's high performance standards based on its natural elasticity, tensile strength, barrier protection, durability, and elongation characteristics.

Guayule has been known as a source of rubber since the pre-Columbian times when Indians of Mexico used it to form balls for their games. In the early 1900s, guayule was first considered

as an alternative source of natural rubber in the United States because of the high price of tropical rubber from the Amazon region.

Guayule is adapted to hot desert environments, and sites with well-drained desert soils and relatively low concentrations of nutrients. Sandy-loam soil are most suitable since root diseases, which are exacerbated by standing water, are one of the few problems encountered in guayule cultivation. Fertility treatments have been shown to have little effect on growth, and guayule is only slightly tolerant to soil salinity.

Effective processing of rubber and non-rubber coproducts is essential to a viable guayule industry. Rubber in guayule is found in the parenchyma cells, mainly in the bark, and must be released during processing. During the present effort to commercialize guayule three processing methodologies have been researched

Former USDA scientist, Dr. Katrina Cornish developed proprietary methods of farming, harvesting Guayule and biotech programs have been now been developed that increase the plant's latex yields with faster growing cycles to produce more product for the medical, building, and energy industries.

In April 2008, the U.S. Food and Drug Administration cleared for marketing the first device made from guayule latex, the Yulex Patient Examination Glove, which was submitted by Yulex Corporation.

More than 2,000 species of plants can produce rubber, but guayule (*Parthenium argentatum*) is the only one other than the rubber tree which has had commercial success, dating to the first decade of the twentieth century, when guayule rubber producers operated along the U.S.-Mexican border. Recently, renewed interest has developed because of the discovery that guayule rubber has a protein content one-fifth that of the Hevea, natural rubber plant.

Guayule latex is unlikely to cause widespread sensitization associated with Hevea latex and is safe for people with latex allergies. This means that guayule users are far less likely to develop latex allergies and, if already allergic, are safe from adverse reactions. In addition, research performed by USDA and private industry is finding uses for the 85 to 90 percent of the guayule shrub that remains after latex extraction. For example, the recent study showed the guayule fibers to contain a type of natural pesticide to termites and, in addition, to be anti-fungal.

The University of Arizona, in cooperation with the USDA-ARS, has maintained and evaluated plantings of guayule, the Chihuahuan desert-native shrub, for the past 10 to 15 years. Maintaining germplasm, selecting varieties, evaluating latex rubber yield potential, modifying cultural practices and investigating alternative uses of the guayule plant have been the objectives of this project.

Kurt Nolte is an area agriculture agent with the Yuma County Cooperative Extension. He can be reached at 928-726-3904.