Lesquerella is a crop grown in Yuma County having minimal acreage, but could have a future here as an oil seed crop. With funding from the USDA, researchers at the University of Arizona are looking at Lesquerella, a member of the mustard family, as a potential source for energy and other useful applications.

- Lesquerella (*Lesquerella fendleri*) grows naturally in arid and semi-arid landscapes and is native to areas in the southwest United States and Mexico. The plant produces seeds that are slightly smaller than alfalfa, but contain a unique vegetable oil rich in hydroxy fatty acids.

- Seed oil is used in a wide array of products, including lithium greases, polymers in paints and coatings, base stocks as lubricants, and applications in the personal care industry. Researchers are excited about the potential of lesquerella because the current source of hydroxy fatty acids is imported castor, which contains the toxic chemical ricin.

- Researchers have worked to develop new products derived from lesquerella seed oil and are currently marketing them to a wider audience. The group collects seed from native populations across the United States and Mexico and evaluates their use in breeding programs. The research teams developed new breeding lines to increase hydroxy fatty acids and oil content.

- Lesquerella has several novel properties absent in other oilseeds. The oil contains natural, unique molecules (estolides), which are rare in other seed oils. These molecules promote natural ease of flow of the oil under many different conditions. Naturally occurring estolides allow lesquerella oil to flow more easily than petroleum at cold temperatures.

- Lesquerella could provide an agricultural alternative to petroleum that can grow successfully in less productive environments. The Department of Energy is also evaluating lesquerella oil products as bio-diesel additives. In addition, studies show that the high level of hydroxy fatty acids in lesquerella increases oil lubricity as compared to other vegetable oils. A private company, Technology Crops International, plans to market lesquerella oil.

- Lesquerella seed contains oil used by industry for making resins, waxes, nylons, plastics, corrosion inhibitors, coatings, lubricating greases, and cosmetics. The molecular structure of the oil is similar to ricinoleic acid of castor oil, except lesquerella has two additional carbons at the carboxyl end of the carbon chain. Essentially all castor oil production in the U.S. has been eliminated by a combination of economic factors, excessive allergenic reactions of field and processing workers, and toxicity of the seed meal. Lesquerella could serve as a partial replacement for imported castor oil, along with other formulation possibilities.

- The seed coat of several Lesquerella species, including *L. fendleri*, contains a natural unique gum that can be separated either before or after the oil is extracted. The gum could be as valuable as the oil. Possible uses include cosmetics, plasticizers, lubricants, coatings, and thickening agents for foods and for crude oil recovery. Cattle feeding trials have shown that
the seed meal has promise as a protein supplement for livestock. The meal contains 30 to 35% crude protein and is similar to soybeans in the amino acid profile.

- *Lesquerella fendleri* is the only species currently being domesticated although several others may have potential. It has the most productive seed yield of Lesquerella species evaluated. The seed oil content is around 24%. The lesquerolic acid is 60% of the total oil. Oil and lesquerolic acid contents continue to increase through plant breeding efforts. Lesquerella is a perennial species grown in production as an annual. This species will most likely be grown exclusively in the southwestern U.S. Other species of Lesquerella, or Physaria, a closely related genus, which have similar yield qualities and high lesquerolic acid contents, could later be developed for production in other environments.

- The cosmetic industry appears to be the first developed market for lesquerella oil, because the high value of these products allows a higher price to be paid as a specialty oil. As more seed becomes available, and production and processing information is more defined, other markets will follow. There are many products that could be developed from this hydroxylated Lesquerella oil. Currently castor is the only available source of this type of oil. Castor oil is not produced in the U.S. and must be imported from other countries. The United States presently spends about $40 million a year on castor imports from China, India, Thailand, and Brazil.

- Research has indicated that lesquerella has potential as a crop plant for Arizona. It has an annual water requirement of about 24 inches, which is lower than that of many crops presently being grown in southwestern United States.

- Research has been conducted at the University of Arizona, Maricopa Agricultural Center on many aspects of lesquerella production such as water management, dates of planting, seeding rates and plant populations, planting systems, weed control and harvesting.

- In the past, the barrier to using Lesquerella oil commercially was its color. Lesquerella typically renders reddish brown oil, which isn’t suitable to manufacture certain products, especially cosmetics. However, removing the pigment from the oil isn’t cost-effective. To solve this problem, the Arizona-based U.S. Water Conservation Laboratory developed a hybrid of Lesquerella with yellow seeds, which carried much less of the troublesome pigments.

- Lesquerella may prove valuable in other commercial applications. For instance, researchers are looking into the possibility of using the gum extracted from the meal of the plant to use in a manner similar to xanthan gum. In this capacity, Lesquerella gum may be used as a thickener in products ranging from ice cream to paint. In addition, the meal left over after extracting the gum, which has a fairly high protein content, may be used as a protein supplement in livestock feed.

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