Speeding Natural Rubber Production

Latex gloves, tennis shoes, and baby pacifiers may someday be made from wildflowers, thanks to a discovery by Agricultural Research Service scientists.

Right now, these and some 40,000 other rubber products are derived only from the tropical Brazilian rubber tree, *Hevea brasiliensis*. But 2,500 other plants—including common species such as goldenrod and guayule—also make rubber. Most plants just don't produce it fast enough to make collecting and processing worthwhile.

Katrina Cornish and Deborah Siler have found a way to speed up a plant's natural rubber-producing ability. Both scientists work at the ARS Western Regional Research Center in Albany, California.

The key lies in one of the molecules that starts the rubbermaking process.

"You can think of rubber as beads on a string," explains Siler, a molecular biologist. "Each bead is made of an isoprene molecule. We discovered that the first bead on the string, a carbon-based molecule called an initiator, regulates how fast other beads are added to the string. The faster that happens, the more rubber is produced."

Rubber starts forming when an initiator binds to an enzyme called rubber transferase. These initiators come in four sizes.

Cornish and Siler discovered that the large initiators cause plants to make rubber up to six times faster than the small ones. But it's up to chance whether an initiator bumps into a rubber transferase enzyme.

"Many different plant enzymes compete for the same initiators to synthesize thousands of other substances, such as pigments and scents," says Siler.

So the scientists plan to genetically engineer a plant such as goldenrod or guayule to make more large initiator molecules. "If you could overproduce them, you would boost the odds that a rubber enzyme and large initiator would meet. This could turn more plants into commercial rubber producers," says Cornish, a plant physiologist.

The goal of the research is to develop a domestic source of rubber.—By **Kathryn Barry Stelljes,** ARS.

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