

Patchouli & Synthetic Biology

A Case Study



The patchouli plant.

Product: Part of the mint family, the patchouli plant (*Pogostemon cablin*) is native to tropical Asia, where it is mainly grown. Indonesia is the main supplier with two thirds of global production (mainly on the island of Java), followed by China and Malaysia. Patchouli is believed to have originated in the Philippines. To extract patchouli oil from the plant's leaves to a commercial standard requires the use of a solvent and a distillation process. Known for its distinct fragrance and frequently used in perfume and incense, patchouli oil can be found in laundry detergents, air fresheners, baby wipes, and more.

Status: Patchoulol, the key component patchouli oil, has been produced through synthetically altered microorganisms by California-based biotech company Amyris in partnership with Firmenich, the Swiss purveyor of perfumes and flavours. The companies say they have developed a novel bioprocess for producing large, quality volumes of patchouli oil from yeast and are currently doing so in Amyris's facility in Brotas, Brazil.

Affected country/region: the smallholders and small farmers of Malaysia, China, Indonesia and Singapore will inevitably be affected by Amyris's new product. With this new product, Amyris aims to replace the lengthy cultivation and extraction process with a single manufacturing process that produces patchouli oil in about two weeks.

Market: long-term contracts for dried leaves can fetch \$300-\$350 per metric ton, but purified patchouli oil can fetch \$50 per kilogram. Consumption of patchouli oil in the world is about 1,000 tonnes per annum.

Commercialization: The product Clearwood, a new woody ingredient produced from the fermentation of sugar cane, sourced from Brazil, is being marketed by Firmenich as a total or partial replacement for patchouli oil. The product may be in use in consumer goods like perfumes or other scented products.

Current R&D: In April 2014, the US company Amyris restarted its industrial fermentation site in Brotas, Brazil with the plan of adding patchoulol to its existing farnasene production process. For Amyris and Firmenich, synthetically-derived patchouli will help mitigate and help to solve supply chain problems.

For More Information

ETC Group has published several documents explaining and analyzing the impact of Synthetic Biology on biodiversity and livelihoods including *Extreme Genetic Engineering - An introduction to Synthetic Biology*, *The New Biomasters - Synthetic Biology and the Next Assault on Biodiversity and Livelihoods* and *The Principles for the Oversight of Synthetic Biology* available on our website http://www.etcgroup.org/en/issues/synthetic_biology

