

A Mexican plant could lend the perfume industry more green credibility

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The mere whiff of a dreamy perfume can help conjure new feelings or stir a longing for the past. But the creation of these alluring scents, from the high-end to the commonplace, can also incur an environmental toll. That could change as scientists, reporting in the journal *ACS Sustainable Chemistry & Engineering*, examine a more sustainable way to produce a key perfume ingredient and supply it to fragrance makers around the world.

José M. Ponce-Ortega and colleagues explain that out of the three main ingredients in perfumes, the fixatives, which allow a scent to linger on a wearer's skin rather than quickly dissipate, are often pricey. A particularly coveted fixative comes from a rare whale digestive excretion called ambergris. Not only is its cost exorbitant, but its use is in perfumes in the U.S. and other countries is illegal. That's why many perfumeries long ago turned to a synthetic version. Although not as costly, the substitute still commands a high price, and requires considerable time and energy to make. A simpler way to make synthetic ambergris exists, but the catch is that the starting material is a flowering plant found in Mexico. That means the plant would have to take a fuel-consuming, environmentally unfriendly journey across the ocean to Europe, where many perfumes are made. So Ponce-Ortega's team wanted to see whether the process would be worth it.

To find out, the researchers conducted a supply-chain analysis. They found that producing the fixative using the Mexican plant would generate considerable local profits to the tune of \$20 million per year

and create hundreds of jobs along the supply routes. They did find an environmental cost to the process, but that could be mitigated by using renewable energy sources to produce the fixative.

More information: A Multiobjective Optimization Approach for the Development of a Sustainable Supply Chain of a New Fixative in the Perfume Industry, *ACS Sustainable Chem. Eng.*, Just Accepted Manuscript. [DOI: 10.1021/sc500409g](https://doi.org/10.1021/sc500409g)

Abstract

Ambrox® is an important fixative used in the manufacture of perfumes. It is obtained through complex chemical synthesis routes with high costs. Recent research efforts in the Institute of Chemical and Biological Researches at the Universidad Michoacana have led to the one-step synthesis of Ambrox® from extracts of *Ageratina jocosotepecana* (an endemic plant of the State of Michoacán in Mexico). This new chemical route is attractive from a manufacturing perspective. However, there are several challenges for the industrial application of this plant and its incorporation in the supply chain of the perfume industry. This paper presents a multiobjective optimization approach to the development and assessment of the supply chain of *Ageratina jocosotepecana* to account for its growth in current and reclaimed lands, distribution, processing to yield Ambrox®, and distribution of products. The approach accounts for the economic, environmental and social aspects and establishes systematic tradeoffs. A case study is solved to consider the supply chain and the tradeoffs of the multiple objectives.

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