Researchers produce low-cost hand sanitizer from waste

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A Tel Aviv University breakthrough allows, for the first time, a local production of ethanol—and hand sanitizer—based on plant and paper waste, using a novel lignin (a substance found in plants) degradation process. This revolutionary process could significantly reduce production costs and lead to a decrease in the use of edible plant sources, help protect the environment, and reduce the use of various pollutants (e.g., pest control agents) and greenhouse gases emissions due to environmentally-friendly waste processing.

The method was developed as part of joint research by Prof. Hadas Mamane of the TAU School of Mechanical Engineering, Prof. Yoram Gerchman from the Oranim Academic College-Haifa University, and TAU Ph.D. students Roi Perez, Yan Rosen and Barak Halpern. The research revealed a successful conversion of plant and paper waste into ethanol, the main raw material required for hand sanitizer production. Following the successful experiments, a US patent, based on the process of ethanol production from paper and cardboard recycling waste, was recently registered by TAU.

The global coronavirus crisis has led to a worldwide increase in demands for alcohol (ethanol) based disinfectants, such as alcogel and septol. Ethanol is mostly produced from plants that are used as food sources, such as corn, sugarcane and other carbohydrate-rich crops, and is used mainly as a biological fuel, which has reduced carbon emissions when compared to oil. However, ethanol production is environmentally polluting, since it requires the allocation of large areas for corn cultivation, as well as the use of pest control agents and large amounts of water.

Israel has no local ethanol production and is completely dependent on the annual import of tens of thousands tons of ethanol. As the COVID-19 crisis unfolded and global demands for hand sanitizers rose, concerns emerged of a shortage of hand sanitizers in Israel as a result of quarantine conditions in other states and import limitations.

Prof. Mamane, Head of the Environmental Engineering Program for postgraduate studies in TAU's Faculty of Engineering, explains that "our successful ethanol production from various waste types, including municipal and agricultural trim, straw, paper waste, paper sludge, etc., using a novel, simple and cheap process, that hardly causes any environmental damage, does not require the use of any hazardous materials, and can be implemented in a decentralized manner, on a small scale, as well as part of large-scale fermentation and distillation processes, is a genuine breakthrough."

According to Prof. Mamane, TAU recently started an applicative pilot of ethanol production for use in disinfectants, using Israel's waste, in an attempt to take on the challenge of increasing the efficacy of alcohol production from various types of waste. Prof. Mamane also mentions that "this research has

great potential. Approximately 620,000 tons of plant and similar waste, and 35,000 tons of paper waste, that have no use and whose management requires resources, are produced annually in Israel alone. Salvaging this waste by using it to produce ethanol will cut waste management expenses, increase the efficiency and decentralize ethanol production, reduce resource exploitation of edible plants, and could reduce fuel usage and air pollution, caused by burning of agricultural production that is frequent around the globe."

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