

## UGM Students Turn Peanut Shell into Biofuel

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Four UGM students have sought for the potential of peanut shell as energy sources.

“Our village, Banaran II in Gunung Kidul regency, has peanut yields of 2.64 tonnes per hectare. But the shell of peanut is not utilised, either being dumped or burned down. But in fact, peanut shell has high cellulose compound, so we came up with the idea to study the shell,” said Stephanus Satria, student of Mathematics and Natural Sciences.

The shell has higher cellulose compounds than other waste from corn, straw, sawdust or sugarcane. It reaches as high as 63.5% that makes it potential to be made into bioethanol as alternative energy resources.

To make this, the shell is ground into powder. The lignin in the peanut is removed using NaOH solution to accelerate hydrolysis reaction. The shell later undergoes enzymatic hydrolysis to produce glucose.

“The glucose is fermented with microorganism to produce bioethanol,” he said.

Along with fellow students Nicolaus Elka and Harry Miyosi, they found that 10 g of shell can produce 4 mL of bioethanol.

“Generally, bioethanol making uses acid solution such as HCL and H<sub>2</sub>SO<sub>4</sub> and reaction in high temperature so it is corrosive to the environment and requires high energy. In this research, we use enzymatic method so that the waste will not damage the environment whilst not using high temperature,” said Stephanus.

Based on Statistics Agency, average peanut production in the country is 700,000 tonnes each year. The students estimated if the shell amount is 12-13% of the total, there will be 90,000 tonnes of shell that can be used as bioethanol and produce about 36 million litres of bioethanol each year.

The energy conversion uses generators from biofuel, he added, requiring fuel as much as 3.5 litre/kWh. With normal use of electricity of 124 kWh/house, the production of ethanol from the shell can power 6,000 homes annually.

“We hope the bioethanol can be used as biofuel to power villages that are still not electrified,” he said.

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