

International Collaboration

Scientists from Indonesia and U.S. preserve rainforest, develop new biofuels and discover new medicines with NIH-funded project.

WE ARE UNDERTAKING A BIODIVERSITY survey of the Mekongga mountain range, on the island of Sulawesi, Indonesia. We are assisting Indonesians with preserving their rain forests, while also finding microbial and plant sources for new energy technologies and medicines.

Collaborating institutions:

- Bandung Institute of Technology
- Four University of California campuses
- Indonesian Institute of Science (LIPI)
- Indonesian Ministry of Forestry
- USDA Forest Service

The project's goals include:

- Mapping biodiversity hotspots in a rainforest site on the island of Sulawesi, Indonesia, to aid rain forest conservation.
- Locating yeasts from plants and soil that can grow on and convert waste materials into fuels.
- Discovering potential new medicines using the many plants and microbes found in tropical rainforests.
- Finding cellulase enzymes, which are key to creating biofuels like ethanol.

In addition to scientific reasons, there are strong political reasons to strengthen ties with this stable democracy, and the world's largest predominantly Muslim nation.



As a nation of over 17,000 tropical islands, Indonesia is rich in biodiversity. But the forests are being degraded by logging, agriculture, and mud slides. Using GIS technologies, we are surveying plants, insects, and vertebrates, and identifying the most critical regions in a landscape for preservation of biodiversity. We are using this information to encourage local stakeholders to conserve their biodiversity heritage.



Biodiesel is currently made from edible plant oils such as soy and canola. Potential non-food microbial oil sources include algae, filamentous fungi and yeasts. We are searching for yeasts from plants and soil that can grow on waste streams such as agricultural and municipal waste, and efficiently convert these materials to oils. A number of promising high-oil candidates have been found.



The most significant economic hurdle to utilizing agricultural waste and energy crops for making biofuels like ethanol and other alcohols is the conversion of wood fiber (cellulose) to sugars, using cellulase enzymes. These enzymes are found in nature in decaying plant matter, including microbes found in the guts of animals that eat plants such as the cow rumen, termites, and other insects. We are isolating microbes from the guts of wood-feeding beetle larvae and decaying trees in a rain forest in Indonesia, and testing them for cellulase activity. We have found many new cellulose-degrading microbes.



Plants and microbes are the major sources of many of our medicines. We have scoured the Indonesian rain forest to gather traditional medicinal plants and over 1,000 microbes. We are screening these for new medicines, and have found several new leads including some with anti-cancer activity, anti-inflammatory activity, or effects on the nervous system.

CREDITS:

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