

## **Exploring Local Natural Resources for the Production of Second Generation Biofuels**

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### **Abstract**

Oman, like other countries, needs to identify and exploit all available resources in the context of national sustainable development. Oman like other GCC & oil producing countries is heavily dependent on its oil and gas sector for the majority of its export revenues and government spending. Oman's complex geology makes exploration and production an expensive challenge. Also, the finite nature of fossil fuels, the high demand for energy and the environmentally damaging properties of fossil fuels are pushing research towards viable alternatives. Biofuels, such as biodiesel, ethanol, butanol, and biogas, are considered to be the cleanest liquid fuel alternatives to diesel and gasoline. However, some of the major global challenges in biofuel production are finding the suitable renewable feedstock, optimizing the production process and the cost of scaling up for large-scale production. Current industrial scale production of biofuels still faces the problem of high production cost and low yields. In our research, we developed a potentially economic and competitive process for biofuel production using agricultural wastes in Oman, typically palm tree waste. These wastes accumulate in large amounts (around 62,000 metric tons of residues), and by using them; we not only produce biofuels but also eliminate waste materials that will otherwise pose an environmental and economic burden of disposal. The research presented provides technical and economical solutions on how to bio-convert waste materials into biofuels. The study also provides a solid bioprocess platform for the industry and for local investors to test their feedstock. The final results will demonstrate a conceptual design of biofuel production based on a bio-refinery concept.

The presented research received several local & international awards including the "***L'Oréal UNESCO award for woman in science – Middle East fellowship 2018***", "***The Research Council Award, 2019***" in the Innovation and Technology category and "***Oman woman of the year award – 2019***" for the Innovation and Technology category and is currently in second phase (Pilot scale production) funded by the Omani government.