

# Bioethanol Production from Agricultural Waste Biomass as a Renewable Bioenergy Resource in Biomaterials

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**Abstract** — Biomass is a renewable energy resource with high potential fuel source for the creation of steam and electricity, transportation fuel, medicinal manufacturing industries as well as a solvent in the laboratory. The more efficient use of biomass (derived bioethanol) is demanded to solve the global crisis such as depletion of fossil fuel and global warming (greenhouse gas emissions). It is presently estimated to contribute of the order 10-14% of the world energy supply. Demand for biomass-derived ethanol could be significant if ethanol became oxygenate of choice. Biomass derived biofuel such as bioethanol is increasingly applied for automotive purposes. They have, however, a relatively low efficiency in converting solar energy into automotive power. Manufacturers of proprietary medicines defended the use of ethanol by claiming that it was added to prevent their products from spoiling and freezing. In this study we mentioned the biomass preparation and fermentation techniques for bioethanol production using yeast (e.g. *Saccharomyces cerevisiae*) and reviewed results from different agricultural waste biomass (algae, fruit and fish, chicken). We found fruit (pineapple) biomass was higher and easier to extract than algae and fish biomass.

**Keywords** — biomass, biomaterials, bioethanol, solvent.

## I. INTRODUCTION

Biomass resources include agricultural and forestry residues, municipal solid wastes, industrial wastes, and terrestrial and aquatic crops grown solely for energy purposes. Biomass can be converted to other usable forms of energy and is an attractive petroleum alternative for a number of reasons. Agriculture and forestry residues, and in particular residues from paper mills, are the most common biomass resources used for generating electricity and power [1].

Bioenergy is one of the most important components to mitigate greenhouse gas emissions and substitute of fossil fuels [2]. The need of energy is increasing continuously, because of increases in industrialization and population. The basic sources of this energy are petroleum, natural gas, coal, hydro, and nuclear [3]. The major disadvantage of using petroleum-based fuels is atmospheric pollution [greenhouse gas (GHG)] created by the use of petroleum diesel. Biomass is one of the better sources of energy [3]. Large-scale introduction of biomass energy could contribute to sustainable

development on several fronts, environmentally, socially and economic [5].

The burning of an enormous amount of fossil fuel has increased the CO<sub>2</sub> level in the atmosphere, causing global warming. Biomass has been focused on as an alternative energy source, since it is a renewable resource and it fixes CO<sub>2</sub> in the atmosphere through photosynthesis [6, 7]. Among biomass, algae (macro and microalgae) usually have a higher photosynthetic efficiency than other biomass [8].

[9] reported that Bioethanol is an alcohol made by fermenting the sugar components of biomass. It is made mostly from sugar and starch crops. Ethanol can be used as a fuel for cars in its pure form, but it is usually used as a gasoline additive to increase octane and improve vehicle emissions. Ethanol can be blended with gasoline in varying quantities to reduce the consumption of petroleum fuels, as well as to reduce air pollution.

[10] stated that biobased chemicals and materials are commercial or industrial products, other than food and feed, derived from biomass feedstocks. Biobased products include green chemicals, renewable plastics, natural fibers and natural structural materials. Biopower, or biomass power, is the use of biomass to generate electricity, or heat and steam required for the operation of a refinery. In some biomass industries, the spent steam from the power plant is also used for manufacturing processes or to heat buildings. Such combined heat and power systems greatly increase overall energy efficiency. Paper mills, the largest current producers of biomass power, generate electricity or process heat as part of the process for recovering pulping chemicals. [10] reported that a blending requirement that all gasoline used in Brazil contain a minimum of 25% anhydrous alcohol (reduced to 20% in March, 2006);

## II. MATERIALS AND METHODS

### A. Site

The experiment was carried out in the laboratory of Bio-resource Science, Department of Biotechnology, Institute of Biological Science, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia.