



Zuraida Ahmad

# SAGO

*(Metroxylon Rottb)*

*And Its Applications*

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# **Sago** **(*Metroxylan Rottb*)** **and Its Applications**

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Editor  
Zuraida Ahmad



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# Contents

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<b>Preface</b>	<b>vi</b>
<b>Chapter 1</b> <b>Sago, Its Properties and Applications: A Review</b> <i>Nurizan Omar, Nur Humairah, Maziati Akmal and Zuraida Ahmad</i>	<b>1</b>
<b>Chapter 2</b> <b>Comparative Study between Sytandard and Commercial Sago Starch</b> <i>Norhuda Hidayah Nordin, Zuraida Ahmad, Nurizan Omar and Tuti Yasmin Alias</i>	<b>17</b>
<b>Chapter 3</b> <b>Albumen-Thermoplastic Sago Starch Reinforced Cotton: Agro-Green Composites</b> <i>Yusliza Yusof and Zahurin Halim</i>	<b>27</b>
<b>Chapter 4</b> <b>Bioethanol Production from Sago</b> <i>Maizirwan Mel, Husna Muhammad Nadzri, Mohd Hider Kamarudin and Mohd Ismail Abd Karim</i>	<b>41</b>
<b>Chapter 5</b> <b>Optimizing Bioethanol Production from Sago Starch in Bioreactor for Renewable Energy</b> <i>Mohd Hider Kamarudin, Maizirwan Mel and Mohd Ismail Abdul Karim</i>	<b>59</b>
<b>Chapter 6</b> <b>The Effect of Saccharification Process of Sago Starch into Sugars</b> <i>Maizirwan Mel, Husna Muhammad Nadzri, Mohd Hider Kamarudin and Mohd Ismail Abd Karim</i>	<b>71</b>

<b>Chapter 7</b>	<b>79</b>
<b>Feedstock Preparation of Injection Moulded Stainless Steel Using Biodegradable Starch Binder</b>	
<i>Mohd Afian Omar, Istikamah Subuki, Nor Syakira Abdullah and Tuti Yasmin Alias</i>	
<b>Chapter 8</b>	<b>87</b>
<b>Sago Starch–Nanoclay Biocomposites Film</b>	
<i>Nurizan Omar, Norazah Ishak and Zuraida Ahmad</i>	
<b>Chapter 9</b>	<b>101</b>
<b>Preparation and Characterization of Glycerol Plasticized Sago Starch-Kenaf Core Fibers Biocomposites</b>	
<i>Norshahida Sarifuddin, Hanafi Ismail and Zuraida Ahmad</i>	
<b>Chapter 10</b>	<b>115</b>
<b>Preliminary Study on Superabsorbent Polymer Hydrogel from Sago Starch</b>	
<i>Nurizan Omar, Norhuda Hidayah Nordin and Zahurin Halim</i>	
<b>Index</b>	<b>125</b>

# Chapter 4

## Bioethanol Production from Sago Starch

Maizirwan Mel, Husna Muhammad Nadzri, Mohd Hider Kamarudin  
and Mohd Ismail Abd Karim

Bioprocess and Molecular Engineering Research Unit,  
Faculty of Engineering – International Islamic University Malaysia  
maizirwan@iium.edu.my

**Keywords:** fermentation, hydrolysis, ethanol, optimization, yeast

**Preview.** Two stage processes prior to ethanol production has been proposed which is hydrolysis and fermentation. Commercial enzymes were used in this two steps hydrolysis;  $\alpha$ -amylase (liquefaction step) and glucoamylase (saccharification step). Optimization was carried out in both stages; hydrolysis and fermentation. Three parameters are involved in optimization of % dextrose equivalent (DE); sago starch concentration (20% (w/v), 30% (w/v), 40% (w/v)), glucoamylase enzyme (52 U/g, 78 U/g, 104 U/g) and time during saccharification (1, 2, 3 hours). Three parameters are involved in optimization of ethanol; agitation (100 rpm, 150 rpm, 200 rpm), inoculums (1% (v/v), 3% (v/v), 5% (v/v)) from constant initial stock of  $2.5 \times 10^6$  cells/mL and pH (4, 5, 6). Both optimization studies were carried out using Box-Behnken design. The experiment showed that the optimum parameters for hydrolysis study was identified to be glucoamylase (75.87 U/g), substrate concentration (28.49% (w/v)), and time (2 hours) which produced 62.15 g/L glucose as the fermentation substrate. For ethanol fermentation study, it was identified that the optimum parameters that produced 29.25 g/L were 167 rpm agitation, 3.43% (v/v) inoculums and pH 5.