BIOCHEMICAL STUDIES ON SOME AGRICULTURAL RESIDUES

By

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(B.Sc., Agric., Biochem., 1979)
(M.Sc., Agric., Biochem., 1989)

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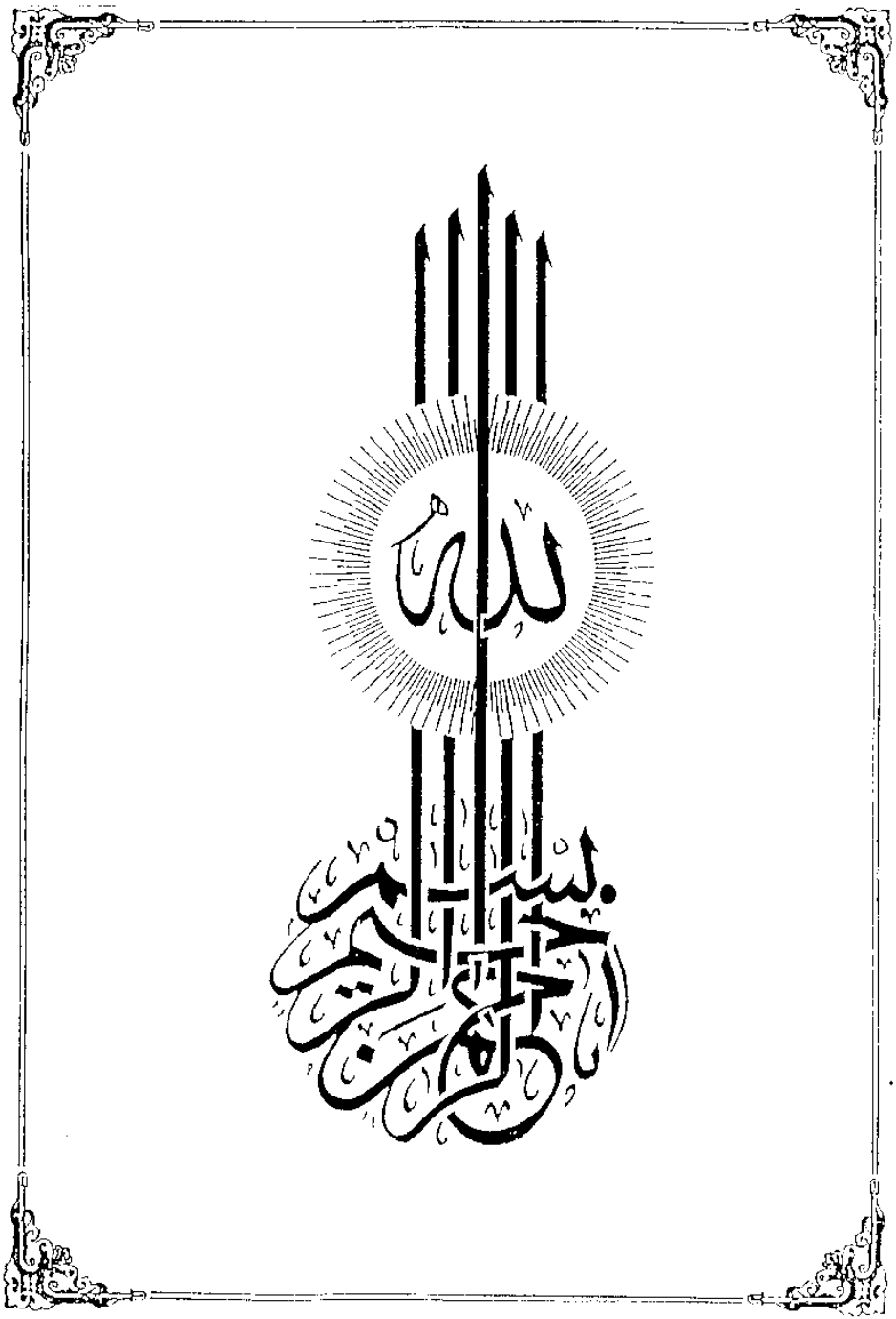

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TO MY DEAR PARENT
AND MY WIFE

FOR THEIR SUPPORT,
UNDERSTANDING
DURING THE STUDY
AND
THE PREPARATION OF
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ABSTRACT

Hassan Ismail Aly Hammouda. Biochemical Studies On Some Agricultural Crop Residuies. Unpublished Ph.D, University of Ain-Shams, Faculty of Agriculture, Department of Agricultural Biochemisstry, 1995.

Lignocellulosic materials are the most abundant renewable resources available for conversion to fuel, chemicals, and single-cell protein. These substances are composed mainly of cellulose, hemicellulose, and heterocyclic compounds, (lignin). Four lignocellulosic substrates; cotton stalks, sugarcane bagasse, maize cobs, and rice straw were used. The native lignocellulosic materials require pretreatments by physical or chemical means for enhancing utilization by the cellulolytic fungi. Different chemical pretreatments (soaking in hot water at 100 and 121^{o}C in autoclave for 1 hr, soaking in 15% HCl at ambient temperature for 6, 12, and 24 hrs; oxidizing agent $NaClO_2$; soaking in 1, 2, 3, 4% NaOH at 121^{o}C in autoclve for 1 hr) were accomplished to make the agricultural crop residues more accessible to degrade by the cellulolytic fungus (*Trichoderma reesei*). Cellulose contents were icreased from 51.1, 47.6, 40.7, and 44.2 to 72.1, 78.1, 72.9, and 75.7 % while lignin contents decreased from 17.0, 19.1, 16.4, and 11.4 to 9.4, 8.8, 7.7, and 5.6 % when cotton stalks, sugarcane bagasse, maize cobs, and rice straw were treated with 4% NaOH, respectively.

Nutritional upgrading of the chemically pretreated cotton stalks, sugarcane bagasse, maize cobs, and rice straw using the cellulolytic fungus (***Trichoderma reesei***) in solid state cultivation technique was investigated. Theresulting fermented rice straw was protein-rich product (9.8 % as crude protein). The chemical composition profile of the resulting fermented product was also discussed.

Ligninolytic fungi (***Phanerochaete chrysosporium*** **and** ***Pleurotus***

ostreatus) were used as a biological pretreatment to make the treated substrate available to be used by the single- cell protein producer fungus (***Trichoderma reesei***). The chemical composition profile of the resulting fermented products was also discussed.

Key Words: cotton stalks, sugarcane bagasse, maize cobs, rice straw, chemical pretreatment, biological pretreatment,
Trichoderma reesei, Phanerocheate chrisosporium, Pleurotus ostreatus, solid-state cultivation.

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