

# TAGUCHI METHOD IN BIOPROCESS ENGINEERING: *Case Studies*

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IIUM Press

# **Taguchi Method In Bioprocess Engineering:Case Studies**

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## Case Study 1: Process Improvement of Pharmaceutical Grade Ethanol Production

*Najiah Nadir, Maizirwan Mel, Mohd Ismail Abdul Karim  
and Rosli Mohd Yunus*

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### 1. Introduction

The world's leading manufacturers and industries are seeking to substitute petrochemical-based feedstock with agricultural-based materials as petroleum supplies continue to decline (Zhan et al., 2003). Great attention has been given to the ethanol production using various substrates which can be classified into three main types of materials, which are sugars (from sugarcane, sugar beet, sweet sorghum, molasses, and fruits), starches (from sweet sorghum grain, cassava, corn, potato, and root crops), and cellulose materials (from agricultural residue, wood, and paper mills) (Lin & Tanaka, 2006), because of the increase in demand for ethanol which is considered as an alternative energy source (Lynd, Cushman, Nichols, & Wyman, 1991).

Sweet sorghum (*Sorghum bicolor* (L.) Moench) is one of the most favourable crops for industrial applications (Zhan et al., 2003). Sorghum is a C<sub>4</sub> plant characterized by a high biomass- and sugar-yielding crop (Bryan, 1990). It contains approximately equal quantities of soluble (glucose and sucrose) and insoluble carbohydrates (cellulose and hemicellulose) (Jasberg, Montgomery, & Anderson, 1983). Sweet sorghum has the ability of remaining dormant during the driest periods and is often judged to be one of the most drought resistant agricultural