

**Regulation of fruit colour development, quality and storage life of *Hibiscus sabdariffa* L. as influenced by plant growth regulators**

ABSTRACT

Bootstrapping the DEA is one of the current methods of measuring robust efficiency by constructing a confidence interval and measuring the noise (bias) in production. In this study, two estimators: the conventional Data Envelopment Analysis (DEA) and bootstrap simulation with 2,000 bootstrap iterations were applied on a cross sectional data of 296 broiler farms in Peninsular Malaysia. The objective of the study was to measure the robust technical efficiency, production bias and factors motivating technical efficiency in the Northern, Southern, and East-central regions of Peninsular Malaysia. As a regional approach, the study found the existence of both inefficiency and noise in broiler farms across regions of Peninsular Malaysia. Findings show disease infestation and unfavorable temperature as components of noise or exogenous factors or factors beyond farmers' control in broiler production. The study identified age (+), education (+), experience (+), production system (-), number of poultry farms owned (-), business status (+) and land tenure status (-) as statistically significant in a meliorating efficiency in broiler production. Result also show that strong statistically significant differences exist in the magnitude of technical efficiency scores between the two estimators across the regions. The study advocate for increase in scale of production as majority of the farmers produce at increasing returns to scale.

**Keyword:** Abscisic acid; Indole-3-acetic acid; *Hibiscus sabdariffa* L.; Postharvest quality; Storage