DESIGN, FABRICATION, AND PERFORMANCE EVALUATION OF SPIRAL GRAVITY SEPARATOR FOR SOYBEANS (*Glycine max* L.)

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ABSTRACT

BAGAPURO, KRISTINE MAE T. and CUSTODIO, LERAINE JOI R., Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, **June 2023**, **DESIGN, FABRICATION, AND PERFORMANCE EVALUATION OF SPIRAL GRAVITY SEPARATOR FOR SOYBEANS (*Glycine max* L.)**

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Soybean (*Glycine max* L.) is the fourth most important grain crop worldwide, after wheat, maize, and rice (Grassini, 2021). At present, the Philippines imports over 99 percent of its soybean requirements from the United States, while the remaining 1% is produced domestically; as estimated by the Department of Agriculture. Separating the soybeans from impurities is an essential post-harvest activity in soybean production.

In CLSU, the existing soybean cleaner lacks cleaning capability as it only removes lightweight impurities, while heavier impurities stay intact with the good seeds. The study was carried out to design, fabricate, and evaluate the performance of a spiral gravity separator for soybean in separating good seeds from impurities. In addition, this was conducted to determine the optimum shaft speed to facilitate the machine's separation performance and conduct a simple cost analysis. The developed soybean separation technology will decrease the labor time and effort, and increase the market value of soybeans.

The spiral gravity separator was designed and drawn based on the physical characteristics of the soybean seeds. It was fabricated based on the design plans and specifications with five (5) main components: hopper, discharge chute, spiral, frame, and transmission system.

Three shaft speeds were evaluated: 20 rpm, 25 rpm, and 30 rpm. One (1) kilogram of samples were used for the three treatments, each with three replications. Results showed that 30 rpm produced the highest cleaning efficiency (93.25%), highest input capacity (31.1 kg/hr), and lowest cleaning loss (1.43%), while 20 rpm made the least mechanical damage (0.83%).

Keywords: Soybean seeds; soybean cleaner; spiral gravity separator; impurities; cleaning efficiency

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