

***DESIGN AND FUNCTIONAL TESTING OF MAGDRY BSF (SMART
DRYER MAGGOT BLACK SOLDIER FLY)***

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ABSTRACT

Black Soldier Fly (BSF) maggot is an alternative livestock feed source containing 40–50% protein and 29–32% fat. However, its high moisture content of 65–72% causes the maggot to spoil easily, while conventional sun-drying methods are less consistent due to weather conditions. This study designed and tested a hybrid solar-powered MAGDRY BSF system for maggot drying. The device consists of a rotary dryer (30 cm diameter, 60 cm length, six fins) driven by a 250 W DC motor with a 1:40 gearbox ratio. Heating was provided by a tubular heater controlled at 60°C using a hybrid solar energy system. Tests were conducted at capacities of 1 kg and 5 kg, drying durations of 1.5, 2, and 3 hours, and motor frequencies of 60 Hz (3.9 rpm) and 80 Hz (6.3 rpm). The calculation results showed that the gearbox output torque of 27.84 N·m was greater than the load torque of 22.05 N·m, while the system power requirement of 202.1 W was lower than the 250 W motor capacity, leaving a power reserve of 47.9 W. The transmission system produced a drum speed of 23 rpm and could be controlled through IoT. The best drying results were obtained at a duration of 3 hours and a frequency of 80 Hz. MAGDRY BSF produced dark brown dried maggot suitable for livestock feed.

Keywords: BSF Maggot, Renewable Energy, Rotary Dryer.