

Uji Kinerja Alat Perangkap Hama Wereng Batang Coklat, Burung Dan Tikus Menggunakan Lampu UV Dan Gelombang Ultrasonik Bertenaga Surya

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ABSTRACT

Attacks by brown planthoppers, rice field rats, and grain-eating birds are among the major factors causing a decline in rice productivity. Pest control methods that still rely heavily on chemical pesticides may have negative impacts on the environment, human health, and agricultural ecosystem balance. Therefore, an alternative technology that is environmentally friendly and sustainable is needed. This study aimed to analyze the effectiveness of a pest control device based on UV light and ultrasonic waves in controlling brown planthoppers, birds, and rats, as well as to analyze the efficiency of the Solar Power Plant (SPP) system used as the energy source for the device. The research was conducted in the rice fields of Kandang Kidul Hamlet, Pecoro Village, Rambipuji District, Jember Regency. The system consisted of a 100 Wp monocrystalline solar panel, a 10 A PWM Solar Charge Controller (SCC), a 12 V 65 Ah battery, a UV lamp, an ultrasonic device, an LDR sensor, and an electric pest extermination circuit. Data collection was carried out by measuring SPP performance parameters, including solar irradiance, voltage, current, power, solar panel efficiency, SCC efficiency, battery efficiency, overall system efficiency, and Performance Ratio (PR), as well as evaluating the effectiveness of the device against target pests. The results showed that the SPP system was able to supply the energy demand of the device effectively, with a Performance Ratio ranging from 88.3% to 89.9%. The UV light effectively attracted brown planthoppers, while the ultrasonic waves were able to reduce rat activity and repel grain-eating birds. Overall, the developed device can be considered an effective, environmentally friendly, and sustainable alternative technology for agricultural pest management.

Keywords: agricultural pest control, grain-eating birds, solar energy, solar power plant, ultrasonic waves, UV light, brown planthopper, rice field rats.