

**DESIGN AND CONSTRUCTION OF PEST CONTROL DEVICE FOR
BROWN PLANTHOPPERS, BIRDS, AND FIELD RATS USING UV LIGHTS
AND ULTRASONIC WAVES POWERED BY SOLAR PANELS**

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ABSTRACT

*Jember Regency, one of the major rice-producing regions in Indonesia, has experienced a decline in rice production and productivity due to infestations of the brown planthopper (*Nilaparvata lugens*), rice field rats (*Rattus argentiventer*), and birds, which directly affect crop growth and yield. This study aims to design a pest control device capable of trapping brown planthoppers and repelling rats and birds using ultrasonic frequencies. The proposed device is designed to: (1) operate automatically using an LDR sensor system; (2) effectively trap brown planthoppers; (3) utilize ultrasonic sound waves to repel rice field rats and birds; (4) operate with low direct current (DC), ensuring safety for farmers; (5) function in remote rice field areas without access to the electrical grid, as it is powered by solar energy; and (6) require relatively low maintenance costs while maintaining long-term operational capability. The pest control system utilizes a solar panel as its energy source and is equipped with a UV light trap and an ultrasonic sound generator, both of which operate automatically through an LDR sensor. Functional testing demonstrated that the device performed effectively. The average energy consumption of the load was 164.832 Wh, while the average harvested energy reached 251.1003 Wh, indicating that the solar panel generated sufficient energy to exceed the system's power requirements. The developed device successfully trapped brown planthoppers, while ultrasonic frequency outputs of 50–60 kHz for rats and 30 kHz for birds effectively disturbed the pests and encouraged them to move away from the sound source.*

Keywords: *Brown planthopper, solar energy, ultrasonic pest repellent, UV light trap.*