

**PENGEMBANGAN SISTEM DETEKSI OTOMATIS HAMA BURUNG  
PADA LAHAN PADI SAWAH BERBASIS *COMPUTER VISION* UNTUK  
MENDUKUNG *INTEGRATED PEST MANAGEMENT***

**INTISARI**

**Oleh:**

**Hanif Nur Wahid**

**21/479396/TP/13225**

Serangan hama burung, khususnya pada tanaman padi, masih menjadi tantangan signifikan dalam praktik pertanian di Indonesia karena dapat menyebabkan penurunan hasil panen hingga 50%. Keterbatasan metode konvensional dalam mendeteksi dan mengendalikan hama mendorong perlunya pengembangan sistem yang lebih adaptif dan akurat. Penelitian ini bertujuan untuk mengembangkan dan mengevaluasi sistem deteksi otomatis hama burung berbasis teknologi *computer vision* dengan arsitektur YOLO (*You Only Look Once*). Proses pengumpulan data dilakukan melalui perekaman video di lahan sawah menggunakan kamera handphone beresolusi tinggi, yang selanjutnya diekstraksi menjadi 1.330 citra sebagai dataset pelatihan. Dataset dianotasi dan diaugmentasi menggunakan Roboflow, lalu dilatih pada model YOLOv11m dengan berbagai konfigurasi *epoch* (100–250), ukuran gambar 640×640 piksel, dan *learning rate* 0.0001. Model menunjukkan performa terbaik pada *epoch* ke-200 dengan nilai *F1-Score* 0.63, *precision* sebesar 0.63237, *recall* 0.58644, *mAP50* 0.61936, dan *mAP50–95* 0.29866. Hasil ini menunjukkan bahwa sistem mampu mendeteksi keberadaan burung secara *real-time* di lingkungan pertanian yang dinamis dengan tingkat akurasi yang cukup baik. Penelitian ini memberikan kontribusi terhadap pengembangan teknologi deteksi hama otomatis yang mendukung implementasi *Integrated Pest Management* (IPM), serta membuka peluang untuk integrasi dengan sistem pengendalian berbasis otomatisasi di sektor pertanian berkelanjutan.

Kata kunci: hama burung, *computer vision*, YOLO, deteksi otomatis, pertanian presisi

**DEVELOPMENT OF AN AUTOMATIC DETECTION SYSTEM OF BIRD  
PESTS IN PADDY FIELDS BASED ON *COMPUTER VISION* TO  
SUPPORT *INTEGRATED PEST MANAGEMENT***

**ABSTRACT**

**Oleh:**

**Hanif Nur Wahid**

**21/479396/TP/13225**

Bird pests, particularly in rice cultivation, remain a major threat to agricultural productivity in Indonesia, potentially reducing yields by up to 50%. The limitations of conventional detection and control methods necessitate the development of more adaptive and accurate systems. This study aims to develop and evaluate an automatic bird pest detection system based on *computer vision* technology using the YOLO (*You Only Look Once*) architecture. Data collection was conducted through high-resolution video recordings in rice fields using mobile phone cameras, yielding 1,330 extracted images for the *training* dataset. The dataset was annotated and augmented using Roboflow and then trained on the YOLOv11m model with various *training* epochs (100–250), image resolution of 640×640 pixels, and a *learning rate* of 0.0001. The model achieved its best performance at epoch 200, with a *F1-Score* of 0.63, *precision* of 0.63237, *recall* of 0.58644, *mAP50* of 0.61936, and *mAP50–95* of 0.29866. These results indicate the system's capability to detect bird presence in dynamic agricultural environments in real time with a satisfactory level of accuracy. This research contributes to the advancement of automatic pest detection technologies in support of *Integrated Pest Management* (IPM) and opens opportunities for integration with automated control systems in sustainable agricultural practices.

**Keywords:** bird pest, *computer vision*, YOLO, automatic detection, *precision agriculture*