Towards Automated Bird Deterrence in Belgian Endive Coupling AI-Based Detection with Active Deterrence Systems

Mathijs Lens
EAVISE, KU Leuven, Sint-Katelijne-Waver, Belgium

Toon Goedemé
EAVISE, KU Leuven, Sint-Katelijne-Waver, Belgium

Abstract:

Bird damage to belgian endive (chicory) fields represents a recurring challenge for growers, with foraging birds causing significant crop loss during sensitive growth stages. Building on our previously developed Gabor-guided bird camera detection system (Lens & Goedemé, 2026), which enables real-time camera-based localization of far-away birds in agricultural settings, this study investigates its integration with active deterrence mechanisms to create a closed-loop bird deterrence system for large fields.

We propose four deterrence modalities: (1) a traditional static scarecrow as a passive baseline, (2) a random-pattern laser system operating independently of detection events, (3) a targeted laser system triggered by camera-based bird detections, and (4) a drone-in-a-box system that autonomously dispatches a UAV to the detected bird's location. Combining detection with targeted laser deterrence has shown promise in prior work (Chen et al., 2024); this study extends that approach to large-field settings and compares to UAV-based deterrence. In this work we compare passive and active deterrence, both on initial deterrence effectiveness and longer-term habituation rate.

Field trials comparing the static scarecrow and random-pattern laser are completed; trials for the camera-coupled laser and drone systems are ongoing. This paper presents the full system architecture, experimental design, evaluation framework, and initial comparative results.

Keywords:

Tiny Object Detection, Agricultural Monitoring, Bird Deterrence, UAV, Laser.