CLASSIFICATION OF THE SEVERITY OF BACTERIAL LEAF BLIGHT (*Xanthomonas* sp.) IN RICE PLANTS (*Oryza sativa* L.) BASED ON IMAGE PROCESSING VARI DRONE IMAGES

UNDERGRADUATE THESIS

Compiled by:

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AGROTECHNOLOGY STUDY PROGRAM

FACULTY OF AGRICULTURE

UNIVERSITAS PEMBANGUNAN NASIONAL "VETERAN" JAWA TIMUR

SURABAYA

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Submitted to Fulfilll the Requirements for Obtaining
a Bachelor of Agriculture Degree
in the Agrotechnology Study Program

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APPROVAL SHEET

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Submitted on:

14 August 2025

This undergraduate thesis is accepted as one of the requirements for obtaining a Bachelor of Agriculture degree
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CLASSIFICATION OF THE SEVERITY OF BACTERIAL LEAF BLIGHT (*Xanthomonas* sp.) IN RICE PLANTS (*Oryza sativa* L.) BASED ON IMAGE PROCESSING VARI DRONE IMAGES

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ABSTRACT

Rice (*Oryza sativa* L.) is a strategic food commodity in Indonesia that is vulnerable to bacterial leaf blight (*Xanthomonas oryzae*). Early detection of disease severity is crucial to prevent yield loss. This study aims to classify the severity levels of bacterial leaf blight in rice using drone imagery and an image processing approach based on the Visible Atmospherically Resistant Index (VARI) and a Convolutional Neural Network (CNN) model. The research stages included aerial image acquisition, preprocessing, segmentation, vegetation index calculation, and disease classification. The results showed that the CNN model achieved an average classification accuracy of 78.8–87.5%, while the agreement between CNN classification and VARI reference maps reached 38%. These findings indicate that although CNN performs reasonably well in distinguishing disease severity levels, there is a significant difference compared to the VARI method, suggesting the need for further optimization. This study contributes to the development of automated plant disease detection methods using aerial imagery to support precision agriculture management.

Keywords: rice, bacterial leaf blight, image processing, VARI, CNN, drone imagery

ABSTRAK

Padi (*Oryza sativa* L.) merupakan komoditas pangan strategis di Indonesia yang rentan terhadap serangan penyakit hawar daun bakteri (*Xanthomonas oryzae*). Deteksi dini tingkat keparahan penyakit ini sangat penting untuk mencegah penurunan hasil panen. Penelitian ini bertujuan mengklasifikasikan tingkat keparahan hawar daun bakteri pada padi menggunakan citra drone dan metode image processing berbasis indeks vegetasi VARI (*Visible Atmospherically Resistant Index*) serta model CNN (*Convolutional Neural Network*). Tahapan penelitian meliputi akuisisi citra udara, preprocessing, segmentasi, perhitungan indeks vegetasi, serta klasifikasi penyakit. Hasil analisis menunjukkan bahwa model CNN memiliki akurasi klasifikasi rata-rata sebesar 78,8–87,5%, sedangkan kesesuaian hasil klasifikasi CNN terhadap peta referensi VARI mencapai 38%. Temuan ini menunjukkan bahwa meskipun CNN memiliki kemampuan yang cukup baik dalam membedakan tingkat keparahan penyakit, terdapat perbedaan signifikan dengan metode VARI yang memerlukan optimasi lebih lanjut. Penelitian ini berkontribusi pada pengembangan metode deteksi otomatis penyakit tanaman berbasis citra udara untuk mendukung pengelolaan pertanian presisi.

Kata kunci: padi, hawar daun bakteri, image processing, VARI, CNN, citra drone

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The author realizes that this proposal still has shortcomings and limitations. Therefore, the author welcomes constructive suggestions and criticism for future improvements. Hopefully, this thesis can be the beginning of a useful and sustainable scientific contribution.

Surabaya, July 31, 2025

Author

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