

**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 Fulfill the Requirements for Obtaining
a Bachelor of Agriculture Degree
in the Agrotechnology Study Program



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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

FOREWORD

The author would like to express his deepest gratitude to Allah SWT for His abundant blessings, favors, and guidance, which have enabled him to compile and complete this thesis entitled "Classification of the Severity of Bacterial Leaf Blight (*Xanthomonas* sp.) in Rice Plants (*Oryza Sativa* L.) Based on Image Processing VARI Drone Images." This thesis was written as one of the requirements for completing the final project in the Agrotechnology Program, Faculty of Agriculture, UPN "Veteran" Jawa Timur.

The completion of this thesis would not have been possible without the assistance, guidance, and encouragement of various parties. Therefore, on this occasion, the author would like to express heartfelt gratitude to:

1. Dr. Ir. Herry Nirwanto, M.P., as the Main Supervisor, for his guidance, direction, and dedication in accompanying the author throughout the thesis preparation process.
2. Dr. Ir. Sri Wiyatiningsih, M.P., as the Co-Supervisor, for her suggestions and input during the process of writing and refining this thesis.
3. Dr. Ir. Arika Purnawati, M.P., as the First Examiner, for her constructive criticism and suggestions that greatly contributed to improving the quality of this thesis.
4. Dr. Ir. Tri Mujoko, M.P., as the Second Examiner and Coordinator of the Agrotechnology Undergraduate Program, for his contributions and guidance that supported the smooth running of the author's academic process.
5. Fetty Tri Anggraeny, S.Kom., M.Kom., as the Third Examiner from the Computer Science Program, for her input and guidance that enriched the technological perspective in the preparation of this thesis.
6. My parents and family, who have consistently provided moral support, motivation, and prayers, which have been the primary source of strength in completing this thesis.
7. Dykha Maretha Setyawan, a fellow comrade who generously lent her equipment when the author needed it to complete this thesis, and Laura

Enjelika Simorangkir and William Fernando Simanjuntak, the author's partners who continuously provided encouragement and support throughout the thesis writing process.

8. Doktrin Ahmad Davin Najwan S., Maya Dwi S., and Zeti Salsabila P. I., whom the author met through the PKKMB FP 2022 committee, for their unwavering support and positive atmosphere throughout the thesis writing process.
9. Part Dua Anj** Derri Ardi and Esa Rizqi A., as friends during university, who have been a source of comfort, encouragement, and part of the journey through the valuable times from the beginning of university and beyond.
10. Inti Pertemanan Adeet, Agzan, Atun, Azka, Viboo, and Zara, as friends since junior high school who have accompanied me and been a source of comfort and laughter in my life. I hope this friendship will continue to endure for an eternity.
11. GJ Azizah, Affiani, Afif, Afrista, and Tika, as friends whom the author has known since being in class 7H, whose bond remains strong to this day. Thank you for the guidance, motivation, and discussion space that helped the author in compiling this thesis in a more focused manner.
12. All fellow students in the Agrotechnology program at UPN "Veteran" East Java, including classmates from D025, colleagues at the Plant Health Laboratory, and friends from various activities such as committees, student organizations like BEM, BLM, and UKM. Thank you for your cooperation, enthusiasm, and support, both directly and indirectly, which have provided positive encouragement to the author throughout this academic process.

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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