

Anggun Fitroh Rahmawati. 220311100118. Analisis Fase Pertumbuhan Padi Menggunakan Klasifikasi *Supervised* Berbasis Citra SAR dan Divalidasi Citra Drone. Dibimbing Oleh: Fahmi Arief Rahman, S.P., M.Si. dan Ir. Slamet Supriyadi, M.Si.

ABSTRAK

Tanaman padi merupakan komoditas pangan utama yang perlu dipantau fase pertumbuhannya karena setiap fase memiliki karakteristik yang berbeda. Pemantauan fase pertumbuhan dapat dilakukan menggunakan penginderaan jauh, salah satunya melalui citra optik yang mampu memberikan informasi kondisi vegetasi. Namun, pemantauan menggunakan citra optik sering terkendala oleh tutupan awan, sehingga citra Synthetic Aperture Radar (SAR) Sentinel-1 menjadi alternatif yang efektif karena mampu merekam kondisi permukaan bumi tanpa dipengaruhi cuaca maupun kondisi pencahayaan. Penelitian ini bertujuan menganalisis kemampuan citra SAR Sentinel-1 dalam mengklasifikasikan fase pertumbuhan padi di Desa Telang, Kabupaten Bangkalan menggunakan metode *supervised Random Forest* dan mengevaluasi tingkat akurasi berdasarkan validasi citra drone. Data yang digunakan berupa citra Sentinel-1 polarisasi VV dan VH periode Desember 2025–Maret 2026 dan citra drone sebagai data validasi. Tahapan penelitian meliputi pengambilan data citra drone, pengolahan data drone di Agisoft, preprocessing citra SAR, klasifikasi Random Forest, klasifikasi fase tumbuh padi, dan uji akurasi. Hasil penelitian menunjukkan bahwa citra Sentinel-1 mampu merekam perubahan nilai *backscatter* selama siklus pertumbuhan padi sehingga dapat membedakan fase vegetatif, generatif, dan panen/tanah terbuka. Hasil klasifikasi menunjukkan dominasi fase vegetatif terjadi pada 30 Desember 2025 dan 11 Januari 2026 dengan luas 692,76 ha (100%), fase generatif mencapai puncak pada 16 Februari 2026 dengan luas 649,46 ha (94%), sedangkan fase panen/tanah terbuka mendominasi pada 28 Maret 2026 dengan luas 692,76 ha (100%). Validasi menggunakan citra drone menghasilkan nilai *accuracy* berkisar 62%–100%, dan *precision* 57%–100% yang menunjukkan bahwa metode *Random Forest* berbasis citra SAR Sentinel-1 mampu mengidentifikasi fase pertumbuhan padi dengan tingkat ketelitian yang baik.

Kata kunci: *Backscatter*, Drone, Fase Pertumbuhan Padi, *Random Forest*, Sentinel-1, SAR.

Anggun Fitroh Rahmawati. 220311100118. *Analysis of Rice Growth Phases Using Supervised Classification Based on SAR Imagery and Validated by Drone Imagery*. Supervised by: Fahmi Arief Rahman, S.P., M.Si. dan Ir. Slamet Supriyadi, M.Si.

ABSTRACT

Rice plants are a primary food commodity whose growth phases require monitoring because each phase has distinct characteristics. Growth phase monitoring can be performed using remote sensing, one method being optical imagery, which provides information on vegetation conditions. However, monitoring using optical imagery is often hampered by cloud cover, making Sentinel-1 Synthetic Aperture Radar (SAR) imagery an effective alternative because it can record the Earth's surface conditions regardless of weather or lighting conditions. This study aims to analyze the ability of Sentinel-1 SAR imagery in classifying rice growth phases using the supervised Random Forest method and evaluate its accuracy level based on drone image validation in Telang Village, Bangkalan Regency. The data used are Sentinel-1 VV and VH polarization images from December 2025–March 2026 and drone imagery as validation data. The research stages include drone image data acquisition, drone data processing in Agisoft, SAR image preprocessing, Random Forest classification, rice growth phase classification, and accuracy testing. The results show that Sentinel-1 imagery is able to record changes in backscatter values during the rice growth cycle so that it can differentiate the vegetative, generative, and harvest phases. The classification results show that the dominance of the vegetative phase occurred on December 30, 2025, and January 11, 2026, with an area of 692.76 ha (100%), the generative phase reached its peak on February 16, 2026, with an area of 649.46 ha (94%), while the harvest phase dominated on March 28, 2026, with an area of 692.76 ha (100%). Validation using drone imagery produced accuracy values ranging from 62%–100%, and precision values of 57%–100%, indicating that the Random Forest method based on SAR Sentinel-1 imagery is able to identify rice growth phases with a good level of accuracy.

Keywords: *Backscatter, Drone, Rice Growth Phase, Random Forest, Sentinel-1, SAR.*