

INTISARI

Indeks kesehatan tanaman pada lahan pertanian dapat mengalami perubahan akibat variasi kondisi lingkungan, terutama ketersediaan air dan suhu permukaan selama musim kemarau. Kabupaten Situbondo merupakan salah satu wilayah pertanian di Jawa Timur dengan komoditas padi dan jagung yang memiliki luas panen cukup besar. Produktivitas padi dan jagung di Kabupaten Situbondo sebelumnya dikaji menggunakan *Standardized Precipitation Index* (SPI) berdasarkan data curah hujan antarempat kecamatan yaitu Kecamatan Jatibanteng, Arjasa, Mlandingan, dan Situbondo, tetapi pendekatan tersebut belum memberikan informasi mengenai kondisi vegetasi berdasarkan kerapatan vegetasi dan suhu permukaan, serta variasinya antarlokasi lahan pertanian. Akibatnya, wilayah yang benar-benar mengalami tekanan akibat musim kemarau belum dapat diidentifikasi, sehingga pemantauan dan pengambilan keputusan pengelolaan lahan padi dan jagung belum dapat mempertimbangkan kondisi riil pada masing-masing lokasi. Oleh karena itu, diperlukan pendekatan pengindraan jauh yang mampu menggambarkan kondisi kesehatan tanaman berdasarkan respons vegetasi dan kondisi termal permukaan. Proyek akhir ini bertujuan mengidentifikasi indeks dan memetakan sebaran indeks kesehatan tanaman pada lahan padi dan jagung di Kabupaten Situbondo tahun 2022 – 2025 menggunakan *Vegetation Health Index* (VHI) berbasis citra Landsat 8.

Data yang digunakan adalah citra Landsat 8 *Collection 2 Level-2 Surface Reflectance* dan *Surface Temperature* pada periode Mei–September tahun 2022 – 2025. Pengolahan data dilakukan menggunakan *Google Earth Engine* (GEE) untuk memperoleh parameter *Normalized Difference Vegetation Index* (NDVI) dan *Land Surface Temperature* (LST). Nilai NDVI dan LST dinormalisasi berdasarkan nilai minimum dan maksimum historis untuk memperoleh *Vegetation Condition Index* (VCI) dan *Temperature Condition Index* (TCI). VCI dan TCI kemudian diintegrasikan menjadi VHI sebagai indeks kesehatan tanaman. Nilai VHI diklasifikasikan ke dalam tiga kelas indeks kesehatan tanaman, yaitu rendah, sedang, dan tinggi. Data lapangan tahun 2026 digunakan sebagai data referensi untuk mengevaluasi hasil klasifikasi menggunakan *confusion matrix* dan *overall accuracy*.

Hasil menunjukkan adanya variasi indeks kesehatan tanaman pada lahan padi dan jagung selama 2022 – 2025, yang ditunjukkan oleh perbedaan nilai VHI, luas, dan sebaran spasial setiap kelas antartahun. Indeks kesehatan tanaman secara umum berada pada kondisi terbaik pada tahun 2022, kemudian mengalami penurunan pada tahun-tahun berikutnya hingga mencapai kondisi terburuk pada tahun 2024. Hasil VHI dalam proyek akhir ini bersifat indikatif, sehingga nilai yang diperoleh memberikan gambaran kesehatan tanaman berdasarkan respons vegetasi dan kondisi termal permukaan. Hasil identifikasi disajikan dalam bentuk peta, tabel, dan grafik, serta dilengkapi peta interaktif sebagai alternatif penyajian hasil pemetaan.

Kata kunci: *Vegetation Health Index*, indeks kesehatan tanaman, Landsat 8, padi, jagung, *Google Earth Engine*.

ABSTRACT

Crop health on agricultural land can vary due to changes in environmental conditions, particularly water availability and land surface temperature during the dry season. Situbondo Regency is one of the agricultural areas in East Java Province, with paddy and maize as major commodities and relatively extensive harvested areas. The crop health of paddy and maize in Situbondo Regency has previously been studied using the Standardized Precipitation Index (SPI) based on rainfall data from four sub-districts, namely Jatibanteng, Arjasa, Mlandingan, and Situbondo. However, this approach does not provide information on vegetation conditions based on vegetation density and land surface temperature or their spatial variation across agricultural land. Consequently, information on the crop health index and its variation across paddy and maize fields in Situbondo Regency is still unavailable, so areas actually experiencing dry-season stress cannot be identified spatially, and monitoring and decision-making cannot yet consider the actual conditions at each location. Therefore, a remote sensing-based approach is needed to describe crop health based on vegetation responses and surface thermal conditions. This final project aims to identify the crop health index and map its spatial distribution on paddy and maize fields in Situbondo Regency from 2022–2025 using the Vegetation Health Index (VHI) derived from Landsat 8 imagery.

The data used were Landsat 8 Collection 2 Level-2 Surface Reflectance and Surface Temperature data for the period from May to September in each year from 2022–2025. Data processing was conducted using Google Earth Engine (GEE) to obtain the Normalized Difference Vegetation Index (NDVI) and Land Surface Temperature (LST). NDVI and LST values were normalized based on their historical minimum and maximum values to obtain the Vegetation Condition Index (VCI) and Temperature Condition Index (TCI), respectively. VCI and TCI were then integrated to obtain VHI as a crop health index. VHI values were classified into three crop health index classes: low, moderate, and high. Field data collected in 2026 were used as reference data to evaluate the classification results using a confusion matrix and overall accuracy.

The results showed variations in the crop health index on paddy and maize fields in Situbondo Regency from 2022–2025, as indicated by differences in VHI values, area, and spatial distribution of each class between years. The crop health index generally showed the best condition in 2022, followed by a decline in the subsequent years and reaching the poorest condition in 2024. The VHI results in this final project are indicative, providing an overview of crop health based on vegetation responses and surface thermal conditions. The results are presented in the form of maps, tables, and graphs, complemented by an interactive map based on Earth Engine Apps as an alternative means of presenting the mapping results.

Keywords: Vegetation Health Index, crop health index, Landsat 8, paddy fields, maize fields, Google Earth Engine.