

ABSTRACT

This study addresses the challenges of using Drones for scanning soil and leaf quality in agricultural fields, particularly the limitations of Battery quantity and poorly planned Routes. These issues affect operational efficiency and costs in managing agricultural land. This research formulates how the use of a Geographic Information System (GIS) and the Nearest Neighbor Heuristic (NNH) Algorithm can map Drone Routes to ensure fertilization operations are performed in a timely and efficient manner.

The proposed solution leverages GIS for spatial data and complex analysis, while NNH optimizes Drone Route Planning to ensure the Drone visits fertilization points in the most efficient order, saving time and resources.

The research results show that the combined approach of GIS and NNH allows for more efficient Route Planning. Implementation at the Tea and Quinine Research Center in Gambung improved the operational efficiency of Drones in crop fertilization. Improvements in operator skills, time management, and preparation time ensure more efficient and effective fertilization schedules. This solution also includes better Reporting between operators and researchers, allowing for well-monitored Drone operations.

This solution helps reduce human error and increase precision in fertilizer application, minimizing losses due to uneven fertilization. More efficient use of Drones not only saves time and costs but also contributes to a healthier environment and more optimal crop production. Increased operational efficiency and effectiveness support sustainable agriculture and future food Security.

Keywords: Drone, Crop Fertilization, Nearest Neighbor Heuristic, Operational Efficiency, Geographic Information System.