

# **Investigating Fertilizer Spreader Blades for Improved Flow Behaviours and Material Resilience in Palm Plantation Settings**

## **ABSTRACT**

Fertilizer spreaders play a crucial role in evenly distributing granule fertilizer across palm plantations. However, in specific areas where growth conditions are unsuitable, fertilizer application becomes unnecessary. Therefore, this study aims to improve granule fertilizer distribution efficiency through enhanced fertilizer blade design. Using Finite Element (FE) simulation, the stress deformation and deflection of the existing spreader blade were evaluated. Meanwhile, Computational Fluid Dynamics (CFD) simulation was used to investigate the influence of spreader design on fertilizer projection speed and direction in the case of open and closed side discharge. The study revealed that the applied forces increased both the critical stress deformation and deflection. To ensure the fertilizer spreads properly over the desired area, the initial velocity had to be increased proportionally with an increase in the angle of direction. These findings contributed to a deeper understanding of the relationship between fertilizer projection velocity, spreader blade strength, and flow behaviour, enabling the reduction of waste in granule fertilizer, while enhancing the operational efficiency and reliability of fertilizer spreader.