

## **Performance and economic comparisons of manual and mechanised fertiliser applications for mature oil palm**

### **Abstract**

The problem of labour shortage in addition to environmental hazard due to improper fertiliser application method calls for efficient and effective method of fertiliser application. This study compares the productivity of workers, human energy expenditure and operational cost between manual and mechanised method of fertiliser application operation for matured oil palm in Malaysia. Results indicate that workers' productivity increased by 3.74 times with mechanised method compared to the manual method based on the measured field capacities of 4.64 ha per hour and 1.24 ha per hour for the mechanised and manual methods, respectively. In addition, mechanised fertiliser application was 4.53 times less labour intensive than manual application based on the measured human energy expenditure of 2.03 kcal per min and 9.19 kcal per min for mechanised and manual methods, respectively. However, the estimated total cost for the mechanised method is 1.6 times more than the manual method which amounted to an additional cost of RM4.18 per hectare based on the estimated total cost of RM11.10 per hectare and RM6.92 per hectare for mechanised and manual methods, respectively. The high estimated total cost of the mechanised method is due to the low annual usage of the tractor considered in the economic analysis for this study.

**Keyword:** Worker's productivity; Human energy expenditure; Fertiliser application; Mechanisation; Oil palm