Effects of copper and zinc application on the oil palm root morphology and epidermis cell size

ABSTRACT

The growth of oil palm is highly dependent on the availability of nutrients, supplied through fertilizers. This is especially true for peat soils where there is a lack of Zn and Cu due to the soil being deficient of mineral and clay content. The deficiency of Zn and Cu has been found to inhibit oil palm plant and root growth. The objective of this study is to determine the effect of different concentration of Zn and Cu chelates on the root development of oil palm roots cell walls. The oil palm seedlings were harvested after two different growing periods; the first harvest was conducted after three months of planting while the second harvest was after 6 months of planting. The harvested oil palm seedlings were measured for root length, root thickness and root surface area. The best root growth for the copper treatments was with concentrations of 8.00 mg Cu/palm. The cell epidermis size and cortex cells of the oil palm seedlings in this treatment was the smallest, meaning that it did not experience any Cu toxicity, while it had the longest root length, root surface area, root fresh weight and root dry weight. For the zinc treatments, the best root growth was at 5.00 mg/palm. This is because in this treatment, the oil palm seedlings achieved the highest root length, root surface area, root fresh weight and root dry weight. This means that the best concentration of Cu to promote root growth of oil palm seedlings is 8.00 mg Cu/palm while the best concentration of Zn was 5.00 mg Zn/palm. Further research needs to also be conducted using a combination of both Zn and Cu applications at the same time, to determine if the combined micronutrients had different effects on the oil palm seedlings roots growth.

Keyword: Oil palm; Root development; Micronutrients; Zinc; Copper