

Nutrient absorption by oil palm primary roots as affected by empty fruit bunch application

ABSTRACT

Various parts of the oil palm primary roots were tested to determine the part which absorbs nutrients. An understanding of this aspect of nutrient absorption by the oil palm will explain why the application of empty fruit bunches (EFB) is important. Applying EFB increases the amount of roots, thus increasing the palm's ability to absorb nutrients and hence, potentially making fertilizer applications more effective. To determine which part of the roots collects and absorbs nutrients, various locations on the primary roots, starting from the root tip, were treated with a solution of KH_2PO_4 containing $5 \mu\text{g P ml}^{-1}$ and $4 \mu\text{Ci}$ of carrier-free ^{32}P . The various locations were identified based on their colour, i.e. creamy white for the root tip, beige for that part of the root just after the creamy white portion, and dark brown for the oldest part of the root. After 24 hr of exposure, the amount of radioactivity emitted from each location was determined. Another experiment was conducted to determine the nutrient distribution pattern in the root after the nutrient was absorbed. In this experiment, the root tip and the part of the root that was dark brown in colour were treated with potassium chloride solution laced with ^{86}Rb for 24 hr. After that time period, about 1 cm of each treated root, starting from the root tip and moving towards the palm base was cut, and their radioactivity determined. Results show that the part of the root that was creamy white (root tip) was significantly more active ($P < 0.05$) in absorbing the nutrient compared to the other parts of the root. The amount of nutrient absorbed at that part of the root increased over time and was significantly higher ($p < 0.05$) at 72 hr compared to absorption at 24 hr. The nutrient distribution pattern in the root from the point of exposure towards the palm base was different when the nutrient was absorbed from the root tip compared to the older part of the root which was dark brown in colour. When the nutrient was absorbed at the root tip, the distribution pattern of the nutrient along the length of the root from the tip to the base of the palm showed a certain pattern. Nutrient concentration was highest at the tip of the root and gradually decreased along the root towards the palm base. However, the nutrient distribution in the treatment of the dark brown part of the root did not follow the same pattern. It is suggested that the nutrient collected within the spaces in the older brown part of the root and flowed towards the root tip before being absorbed. Application of EFB increased the mass of roots. The results imply that for fertilizer application to be more effective, the fertilizers should be applied to those places where most of the roots are formed, i.e. especially under the heaps of EFB.

Keyword: Oil palm roots; Nutrient absorption; Empty fruit bunches