Leaf nutrient status in relation to severity of Ganoderma infection in oil palm seedlings artificially infected with Ganoderma boninense using root inoculation technique

ABSTRACT

Basal stem rot (BSR) caused by Ganoderma spp., a basidiomycete fungus, is a major devastating disease of oil palm, especially in Malaysia and Indonesia. Several factors were reported to influence the outbreak of BSR disease which include nutrient status, age of palm, types of soil, previous crop and replanting techniques. Elemental nutrient is known to have some beneficial effects on plant disease control. Over many years, macro- and micro-nutrient application has been totally overlooked in oil palm fertiliser programmes in relation to outbreak of BSR disease incidence. A study was conducted to determine leaf nutrient concentrations in relation to severity of Ganoderma infection in oil palm seedlings artificially inoculated with G. boninense using root inoculation technique. This study was conducted at Universiti Putra Malaysia (UPM), Serdang which involved a total of 210 Durax Pisifera (DXP) oil palm seedlings. After inoculation, external and internal symptoms developing on seedlings and disease severity index (DSI, four disease classes of 0, 1, 2 and 3) were recorded. At 15 months of inoculation, leaf samples were collected and macro-nutrient such as Nitrogen (N), Phosphorus (P), Potassium (K), Calcium (Ca) and Magnesium (Mg) and micro-nutrient such as Copper (Cu), Zinc (Zn), Manganese (Mn), Iron (Fe) and Boron (B) were analysed. Analysis of variance (ANOVA) was performed to test the difference between leaf nutrient concentrations in relation to DSI, followed by comparison means using Least Significant Difference (LSD) test at 0.05 significant levels. A total of 25.0% of inoculated seedlings were dead due to G. boninense infection. Significant difference of leaf nutrient concentration in relation to DSI was observed. Leaf macro-nutrient concentration of N, K, and Ca showed significant difference ($p<0.05$) while P and Mg showed no significant difference in relation to BSR disease development. Meanwhile, leaf micro-nutrient concentration of Cu, Mn and B showed significant difference ($p<0.05$) while Zn and Fe showed no significant difference. Among significant nutrients, Ca and Cu were found higher in healthy seedlings (DSI - 0) compared to infected seedlings (DSI – 1, 2 or 3). This study suggested that formulation of fertiliser consists mainly of Ca and Cu are needed in order to reduce BSR disease incidence in oil palms.

Keyword: Basal stem rot; Ganoderma boninense; Leaf nutrient