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Impact of Fertiliser Application on Basal Stem Rot and Lower Frond Desiccation in Oil Palms Established in Peat Soil

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For oil palms established in deep peat soils in the Labuhan Batu district, North Sumatra, Ganoderma basal stem rot (BSR) and lower frond desiccation (LFD) are the two main maladies that have a serious impact on their long-term sustainability. Past experiences have shown that solitary control measures are unlikely to be successful in managing these two maladies and a number of integrated control strategies would be a prerequisite for their management. As nutrition is an important factor influencing fungal disease infection in many crops, nutrient manipulation can be considered as a vital component of any integrated disease management (IDM) system. This paper summarises the impact of fertiliser application on the level of BSR and LFD infection in five fertiliser trials, established in the affected areas from 1996-2021. In both trials established on first and second generation oil palms, application of nitrogen (N) and phosphorus (P) elicited a significant and linear increase in BSR infection levels, the higher the dosage, the higher the BSR incidence. In contrast, potassium (K) inputs had the reverse effect and significantly reduced BSR infection in the first trial but not in the second. A significant negative additive interaction between N x P and P x K was also observed in both trials. Increasing the rates of N together with P or P with K, increased BSR infection, with the highest infection levels being recorded at the highest N2 P2 and P2K2 rates evaluated. Unlike macronutrients, application of boron (B), copper (Cu) and zinc (Zn) micronutrient fertilisers did not have any significant impact on BSR incidence. A similar trend was recorded on LFD incidence in both immature and mature second generation oil palms. Application of N and P also elicited a significant and linear increase in LFD and a strong negative and additive interaction effect between N x P and P x K was also observed. As for BSR, impact of K fertiliser was inconsistent, producing no positive or negative effects in immature palms and only significantly reducing LFD levels in two out of the 6 years of evaluation in mature oil palms. Likewise, application of B, Cu and Zn micronutrient fertilisers also had no impact on LFD incidence. Although peat is reported to be low in silica, application of silica fertilisers, even up to a dosage of 6 kg per palm per year produced no positive benefits. The relationship between nutrients and BSR/LFD infection and the physiological and biochemical mechanisms involved, remains unclear. However, it is interesting to note, that in all three NPK trials, the lowest infection rates were consistently recorded in the zero fertiliser plots. A possible hypothesis is that long-term application and concentration of N and P fertilisers in the weeded palm circles (WPC) could have had a negative impact on beneficial soil microbes inhabiting

the root rhizosphere and associated with oil palm root protection or inducing systemic resistance in the oil palm. However, more detailed studies are required to ascertain the complex relationship between nutrients, soil microbes and disease infection.

Keywords: *Basal stem rot, fertilisers, lower frond desiccation, oil palm, peat.*