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Evaluation of Soil Ameliorants on Immature and Mature Oil Palms in Acidic Peat

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Although peat soil has a low pH range of 3.2 to 3.8 units, it remains unclear whether this is a major constraint to oil palm cultivation, as the cultivar is known to tolerate fairly high levels of acidity without any serious adverse effects. Earlier work on liming and acidity correction has often given conflicting and sometimes, even negative results. In view of the latter, two trials were established to evaluate a number of soil ameliorants and their impact if any, on the growth and yield of newly planted and young mature palms in deep acidic peat. This paper summarises results over a 7- year evaluation period.

Of the four ameliorants evaluated on newly planted seedlings in trial no.1, limestone dust (LSD) was the most effective in correcting acidity, raising the soil pH from 3.6 to 5.4 - 6.1 units in the top 30 cm of soil. Despite the significant improvement in soil pH, no advantage in nutrient uptake, palm growth and fresh fruit bunch (FFB) yield was recorded over unlimed control plots. In contrast, oil palm bunch ash (BA), eucalyptus fly ash (EFA) and paddy husk ash (PHA) had a smaller impact on soil acidity, but increased FFB yield from 2 per cent to 9 per cent, of which BA was the most effective, especially at the higher rate of application (9.0 kg/palm/year).

One negative aspect of acidity amelioration is its impact on peat subsidence. Being highly caustic, application of LSD and BA accelerated decomposition and mineralisation of the peat, increasing subsidence rates by as much as 1.0 cm per annum.

In trial no.2 which evaluated two potash sources [muriate of potash (MOP) and BA] on young mature palms, only annual applications of BA significantly improved soil pH, requiring up to 9.0 kg per palm per year to improve and maintain top soil pH above 5.0 units. BA was also superior to MOP in improving soil fertility, particularly the levels of exchangeable potassium, calcium and magnesium and also significantly reduced the concentration of free aluminium ions and aluminium saturation to low or negligible levels. Although BA ameliorated soil acidity and significantly improved soil fertility, no significant differences in FFB yield were recorded between BA and MOP. With MOP, response to fertiliser inputs was linear, highest yield being achieved with 6.0 kg per palm per year. In contrast, no significant differences were recorded between the different BA rates applied, with 4.50 kg per palm per year producing the same yield response as the highest rate of 11.25 kg per palm per year. For peat soil, BA appeared to be the more efficient K source, as it could attain the same yield as MOP, but at lower K inputs.

As peat is reported to be very deficient in silica, it is suspected that any positive responses elicited by application of ash products (which have high silica content) could be a response to silica rather than correction in soil acidity. However, as no soil, foliar and product analysis was carried out for silica content in both trials, the latter will remain a hypothesis until proven otherwise. Trials are currently underway to evaluate the impact of silica on oil palm growth and yield in peat soils.

Keywords*: Acidity, bunch ash, oil palm, peat, soil amelioration.*