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Author : Hasnol Othman; Farawahida Mohammad Darus; Mohd Hisham Mohd Nor and Samsudin Amit

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Re-evaluation of Nutrients Requirements for Oil Palm Planting on Peat Soil*

HASNOL OTHMAN[1]; FARAWAHIDA MOHAMMAD DARUS[1]; MOHD HISHAM MOHD NOR[2] and SAMSUDIN AMIT[2]

[1]Malaysian Palm Oil Board. P. O Box 10620, 50720 Kuala Lumpur, Malaysia.
[2]CCM Fertilizers Sdn. Bhd., Lot PT 200, Persiaran Selangor, 40000 Shah Alam, Selangor D.E.

Peatland with an area totalling approximately 2.6 million ha is considered a problematic soil in Malaysia, but has potential for oil palm cultivation. In Sarawak alone, peat area covers approximately 1.6 million ha or 13 per cent of the total land area in the state. The poor physical properties of peat such as low soil bulk density, high water table and presence of large quantity of plant biomass with varying stages of decomposition are among the factors that influence the fertiliser requirement of oil palm on peat. Under its natural state, peat is very acidic with low fertility status and high C/N ratio. These properties seriously affect palm growth and yield which need appropriate fertiliser management.

Study at MPOB research station in Teluk Intan, Perak showed that there was an 8 per cent to 15 per cent response to N fertiliser application in the early years of planting. In later years, with improved mineralization of the organic matter, the N response declined with time. Work at MPOB research station in Sessang, Sarawak recorded no significant response to N fertiliser application on FFB yield. The leaf N levels were sufficient for treatments without N application (N_0) and 1.0 kg urea per palm per year (N_1) and the overall mean ranged from 2.69 to 2.79 % of N by dry weight. Low responses to N fertiliser treatment on FFB yield and leaf N level suggest that the optimum rate of N requirement is lower than N_1 rate i.e. possibly as low as 0.5 kg urea per palm per year for mature palms.

MPOB's work at the research station in Sessang, Sarawak showed that application of P fertiliser at rates 1.0 kg (P_1) and 2.0 kg (P_2) of rock phosphate (RP) per palm per year significantly increased the FFB yield from 144.7 to 154.3 and 158.0 kg per palm per year accounting for 7 per cent and 9 per cent increase over P unfertilised plots

respectively. On the other hand, no significant differences in FFB were recorded between P_1 and P_2 rates. The P fertilizer treatment showed no response of leaf P in early years of planting. The leaf P levels over the 8-year period showed a sufficient level even at P_0 rate ranging from 0.145 per cent to 0.160 per cent of dry weight. Results from this study indicate that the optimum P fertiliser requirement for mature oil palm on peat should not exceed 1.0 kg RP per palm per year.

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Peat is highly deficient in K and oil palm requires high amount of external K application. MPOB's work at Teluk Intan, Perak showed that oil palm responded to K fertiliser application (up to 6.0 kg MOP per palm per year) consistently. Study at MPOB research station in Sessang, Sarawak showed that K fertiliser treatment recorded low response of FFB yield as well as leaf K level. The application of MOP up to 6.0 kg per palm per year (K_3 rate) significantly increased the average bunch weight but not enough to increase the FFB yield substantially. In the early years, leaf K showed deficient levels for all K fertiliser rates ranging from 0.76 per cent and 0.89 per cent of dry weight. Later, application of K fertiliser at K_2 and K_3 rates showed a sufficient leaf K level. Current study at MPOB research station in Teluk Intan, Perak show that the application of natural zeolite at 3.0 kg per palm per year significantly increased FFB yield of oil on peat. With zeolite application, optimum K fertiliser requirement recommended at the rate of 3.5 kg per palm per year of MOP, was lower as compared to treatment without zeolite application (of 5.0 kg per palm per year of MOP).

Six selected NPK fertiliser rate combinations ranging from the lowest ($N_0P_0K_1$) to the highest ($N_1P_2K_3$) rate were analysed for judicious optimum fertiliser input. The response of these N, P, K rates on 6-year mean FFB yield showed that the application of $N_1P_1K_2$ rate gave the highest FFB yield. At the 6-year mean FFB yield increased to 158.37 kg per palm per year giving an increase of 15 per cent and 10 per cent compared with $N_0P_0K_1$ and $N_1P_1K_1$ (i.e. 1kg urea, 1 kg RP and 4 kg MOP per palm per year from year 5 onwards) rates respectively. An increase in fertiliser combination rate to more than $N_1P_1K_2$ showed no response on FFB yield production. MPOB's work at the research stations in Teluk Intan, Perak and Sessang, Sarawak confirmed that there was adequate Mg in the peat to meet the palm's requirement.

***Keywords**: Oil palm, peat soil, fertiliser requirement, zeolite,*