

2014

June

Withdrawal of Fertiliser and Its Impact on the Nutrient Status, Growth and Production of Previously Fertilised Oil Palm

MANJIT SIDHU¹, MARTIADI KURNIAWAN, ENY FITHRI RAMBE¹, ZULKASTA SINURAYA¹, ABDUL AZIZ¹, ABDUL HASYIM¹ AND MUKESH SHARMA²

A long term NPK factorial fertiliser trial established on a highly leached and infertile soil was converted into a fertiliser withdrawal trial to monitor the residual effects of previous fertiliser applications on the nutrient status, growth and production of 14-year-old oil palm.

Of the three major nutrients, nitrogen (N) had the shortest residual effect. A decline in leaf N was recorded two years after fertiliser termination whilst growth parameters such as frond dry weight, petiole cross section and leaf area were affected as early as 12 months after ceasing fertilizer application (MACF). However fresh fruit bunch (FFB) yield only declined in the third year, commencing at 30 MACF. Depletion of N negatively impacted both average bunch weight (ABW) and number of bunches (NOB) harvested, albeit at different time periods.

In view of its high soil reserves, residual effect of phosphorus (P) was longer than either nitrogen or potassium. Although the decline in leaf and rachis P content also occurred within 24 MACF, FFB yield decline only occurred in the fourth year, commencing at 44 MACF. Like N, P withdrawal also had a negative impact on both ABW and NOB harvested.

The residual effect of previous potash (K) manuring was found to be intermediate between N and P. In view of the high yields and high K demand of the oil palm in the trial plots, a decline in leaf and rachis K was recorded as early as 12 MACF. This was paralleled by a rapid depletion of soil K reserves within the same short period. Due to the lag-phase between nutrient depletion and yield decline, the latter only occurred in the fourth year, commencing at 39 MACF. Unlike N and P, withdrawal of K fertiliser had no negative impact on ABW but significantly reduced NOB harvested.

Complete stoppage of all fertilisers (N,P,K) simultaneously, even only for a period of one year, had a negative impact on palm nutrient status, vegetative growth and FFB production. The timeframe of palm responses to complete fertiliser withdrawal mirrored those induced by N stoppage rather than those due to P and K termination. However, growth and yield depression was short lived with recovery occurring within 24 months after resumption in manuring.

The results indicate that even on highly leached and impoverished soils, it was safe to terminate N, P, K fertiliser applications a minimum of two years prior to replanting. For existing plantings, the long residual effects of previous P and K applications also provided some scope for selective reduction in the latter two fertiliser types, in times of low palm oil prices or financial crisis. However, N inputs cannot be completely stopped even for one year.

Keywords: Fertiliser, withdrawal, oil palm.

