

# Plant Nutrients Exported in Palm Oil

Research in Southeast Asia and Africa shows that each ton of oil palm fresh fruit bunches (FFB) contains 3.0-5.0 kg of nitrogen (N), 0.3-0.7 kg of phosphorus (P), 3.5-5.3 kg of potassium (K), and 0.5-0.9 kg of magnesium (Mg) (Tinker and Smilde, 1963; Ng and Thamboo, 1967; Tarmizi and Mohd Tayeb, 2006; Prabowo *et al.*, 2006; Donough *et al.*, 2014).

It takes approximately 5 tons of FFB to produce a ton of crude palm oil (CPO). For large plantations, this means a huge loss in nutrients via FFB. This nutrient loss must be replaced, usually by using fertilizers, in order to sustain the high yield of FFB as well as the fertility of the soil in the plantation.

Only a portion of the original nutrients contained in the FFB are found in the empty fruit bunches and palm oil mill (POM) effluent (Prabowo *et al.*, 2006). Any nutrients contained in the CPO and palm kernel produced and sold by the POM will be lost from the system.

The major factor will be the CPO, as the quantity of palm kernel produced is only 20% of the palm oil production. So how much plant nutrients are contained in CPO?

Almost no information is available to answer this question as most research on nutrients in CPO has focused on human health and nutritional aspects.

To fill this knowledge gap, International Plant Nutrition Institute's Southeast Asia Program analysed CPO from a project in Central Kalimantan to determine the plant nutrient content. Results showed that some of the N, P, K and Mg from applied fertilizers do end up in the CPO, but only a very small amount of plant nutrients (0.002 kg of N, 0.09 kg of P, 0.05 kg of K, and 0.015 kg of Mg) are found in each ton of the final CPO produced for sale by the mill (Donough *et al.*, 2016).

This means that most of the plant nutrients contained in the CPO as well as in the original FFB are retained within the palm oil mill system. Therefore, for long term sustainability and to improve the efficiency of use of plant nutrients, particularly fertilizers, more studies into the fate of plant nutrients in the POM are warranted, and better ways of recycling plant nutrients to the plantation should be developed.

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