

Field Trials in Oil Palm Estates to Determine Organophosphorus Pesticide Residues in Crude Palm and Palm Kernel Oil

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Supervised residue field trials were carried in oil palm estates located at four different regions in Malaysia. The objective of the trials was to quantify the residual level of the organophosphorus pesticides, acephate, methamidophos and monocrotophos, in oil extracted from oil palm fruits and palm kernels harvested from oil palms treated with these pesticides. These three pesticides are commonly used to combat bagworm infestation.

In each field trial, selected palms were treated with the pesticides by the trunk injection method. Fresh fruit bunches (FFB) from treated palm trees were then harvested at intervals of 1, 3, 5, 14, 21 and 28-day/s after trunk injection to obtain pesticide residue decline data. To determine the pre-harvest interval (PHI) which provides information on the pesticide's use pattern and of the amount of pesticide residues allowed on oil palm fruits, FFB were harvested at intervals of 5, 14 and 21 days after trunk injection. Crude palm oil (CPO) was then extracted from the harvested fruits by pressing while crude palm kernel oil (CPKO) was extracted from the palm kernels by Soxhlet extraction. Both oils were then taken through a clean-up process using the solid phase extraction method before analysis of pesticide residues using a gas chromatography with a pulsed flame photometric detector (GC-PFPD).

Results showed that there were no detectable ($\leq 0.01 \mu\text{g g}^{-1}$) pesticide residues in CPO and CPKO extracted from FFB harvested from oil palms treated with the organophosphorus pesticides. As all three pesticides investigated are highly soluble in water ($> 200 \text{ g L}^{-1}$), it is postulated that residual levels of pesticides were not found in the oil because they were probably discarded together with the water fraction during the oil extraction process. It can therefore be concluded that under Malaysian good agricultural practices in oil palm plantations, applications of acephate, methamidophos and monocrotophos through trunk injection posed no significant health risk to consumers because no detectable levels of the residues were found in CPO and CPKO.