UNIVERSITI PUTRA MALAYSIA

DECOMPOSITION OF EMPTY FRUIT BUNCH AND ITS INTERACTION WITH INORGANIC N AND K FERTILISERS IN OIL PALM

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DECOMPOSITION OF EMPTY FRUIT BUNCH AND ITS INTERACTION WITH INORGANIC N AND K FERTILISERS IN OIL PALM

By

LIM KIM CHIEW

Thesis Submitted in Fulfilment of the Requirements for
the Degree of Master of Agricultural Science
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DECOMPOSITION OF EMPTY FRUIT BUNCH AND ITS INTERACTION WITH INORGANIC N AND K FERTILISERS IN OIL PALM

By

LIM KIM CHIEW

May, 1998

Chairperson: Associate Prof. Dr. Hjh. Zaharah Abd. Rahman

Faculty: Agriculture

Investigations to study the multifactorial interactions between applying varying rates (M) of empty fruit bunch (EFB) with different rates of inorganic nitrogen (N) and potassium (K) fertilisers and to determine the effects of these inorganic fertilisers on decomposition and mineralisation rates of EFB in mature oil palm were undertaken. Two experiments were carried out viz. EFB-nutrient interaction studies and EFB decomposition and nutrient mineralisation studies. Significant M x N interactions were detected in all palm growth parameters and some

important soil chemical properties. Palm nutrition, vegetative vigor and yield of fresh fruit bunch (FFB) were all enhanced, with the exception of leaf magnesium levels which significantly decreased. Significant M x K interaction enhanced leaf potassium level but decreased leaf magnesium. No significant effects on leaf nitrogen and phoshorus were detected. Vegetative vigor and yield were also significantly increased but no M x K significant effects were detected on soil chemical properties.

There was a rapid initial dry matter loss of the EFB with declining rates at the later months after field application. Total physical disintegration was observed at eight months with dry matter loss of 70%, after which there was hardly any loss up to the 10th month. Differences in decomposition rates were detected among the three layers of EFB. Inorganic N additions generally increased EFB decomposition.

No evidence of EFB-N release was detected during the ten months of monitoring. There were no effects of inorganic N or K on EFB-N release. A rapid release of EFB-K was experienced in its initial stages cumulating to 90% after six months. Subsequently, the release was slow and at the tenth month more than 99% EFB-K was released. Differences in EFB-K release were detected among the three

layers of EFB. Addition of inorganic N generally increased rate of EFB-K release. Addition of inorganic K caused a general decrease in EFB-K release.

The significant interactions of EFB mulching with inorganic N or K fertilisers detected in enhancing oil palm growth i.e. M x N and M x K interactions, were mainly due to the beneficial effects of mulching by the EFB.

Abstrak Tesis yang Dikemukakan Kepada Senat Universiti Putra Malaysia Sebagai Memenuhi Syarat Keperluan Untuk Ijazah Sarjana Sains Pertanian

PEREPUTAN TANDAN KELAPA SAWIT KOSONG DAN INTERAKSI DENGAN BAJA N DAN K TAK ORGANIK KEATAS KELAPA SAWIT

Oleh

LIM KIM CHIEW

Mei, 1998

Pengurusi: Prof. Madya Dr. Hjh. Zaharah Abd. Rahman

Fakulti. Pertanian

Kajian telah dijalankan untuk mengkaji interaksi multifakta diantara pemberian berbagai kadar (M) tandan kelapa sawit kosong (EFB) dengan kadar baja nitrogen (N) dan kalium (K) tak organik, dan menentukan kesan baja tak organik ini keatas kadar penguraian EFB dan pemineralan nutrien apabila EFB diberikan kepada kelapa sawit matang. Dua ekspiremen telah dijalankan, iaitu, kajian interaksi EFB-nutrien dan pereputan EFB dan pemineralan nutrien. Interaksi M x N yang bererti

dalam semua parameter tumbesaran kelapa sawit dan sesetengah sifat kimia tanah yang penting. Pemakanan kelapa sawit, pertumbuhan vegetatif, dan hasil tandan (FFB) semuanya meningkat, manakala, kepekatan Mg dalam daun menurun. Interaksi M x K yang bererti telah meningkatkan kepekatan K dalam daun, manakala kepekatan Mg menurun. Tidak ada kesan yang bererti didapati bagi unsur N dan P dalam daun. Pertumbuhan vegetatif dan hasil FFB juga bertambah dengan bererti, tetapi tidak ada kesan M x K yang bererti dikesan keatas sifat-sifat kimia tanah.

Kehilangan berat kering EFB ditahap awal berlaku dengan cepat sekali. Diakhir kajian, kehilangan berat kering berkurangan. Pereputan EFB secara fizikal pada keseluruhannya didapati selepas 8 bulan EFB diletak diladang, dimana 70% daripada berat kering asal telah hilang. Tidak ada kehilangan berat kering yang ketara didapati berlaku diantara 8 hingga 10 bulan berikutnya. Perbezaan ketara didapati dalam ketiga-tiga lapisan EFB. Pemberian baja N pada kadar N1 dan N2 didapati meningkatkan kadar pereputan EFB.

Pembebasan EFB-N tidak kelihatan dalam masa 10 bulan. Pembajaan N dan K tak organik tidak memberi kesan keatas pembebasan EFB-N. Pembebasan EFB-K amat cepat ditahap awal pereputan dan meningkat sehingga 90% selepas 6 bulan.