

# PALM-BASED BIO-FERTILIZER FROM DECANter CAKE AND BOILER ASH OF PALM OIL MILL

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MPOB INFORMATION SERIES • ISSN 1511-7871 • JUNE 2008

MPOB TT No. 412

**D**ecanter cake (DC) and boiler ash (BA) are wastes from the palm oil mill. A mill with 90 t hr<sup>-1</sup> FFB processing capacity will produce about 160-200 t DC and about 180 t BA a month. Both the DC and BA are sources of nutrients for producing bio-compound fertilizer. Recycling them will reduce the cost of palm oil production.

## METHODOLOGY

### Waste to Wealth Strategy

The DC and BA accumulated over time will pose a problem to the palm oil mill in their disposal. The mills with land will just dump them in the field. Although they are rich sources of plant nutrients (Tables 1 and 2), they can be further enriched by adding inorganic fertilizers to produce a more valuable product.

### Technology

The process and flow diagram for the production of palm-based bio-fertilizer (PBF) from DC and BA are illustrated in Figure 1. Wet DC straight from

the decanter is put in a mixer to mix with inorganic fertilizers following an MPOB formulation. The mixture then enters a rotary drier drum for drying. The dry mixture goes into a silo for storage prior to sifting to different-sized granules for different forms of the fertilizer. The granules are then packed in standard fertilizer bags as bio-compound fertilizer.

Table 3 shows the nutrient contents of a PBF. It also contains high carbon (28%) and has a pH of 7, which would improve the soil organic matter content and reduce the acidity.

The uptake of nutrients by oil palm seedlings using PBF vs. standard inorganic compound fertilizer (12: 12: 17: 2 + T.E) and a control (without fertilizer) was compared. Table 4 shows that the nutrient levels in the PBF treated palms were comparable to those in palms receiving the standard compound fertilizer. Thus, the bio-compound fertilizer was as effective as the standard inorganic fertilizer in terms of supplying nutrients to the plants. The palms of control plot showed imbalance of nutrients concentration with low N, P and K and high Ca and Mg levels.

TABLE 1. PLANT NUTRIENT CONTENTS (%) AND pH OF DECANter CAKE

N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	CaO	MgO	pH
2.42	0.51	1.24	1.68	0.54	4.8

TABLE 2. PLANT NUTRIENT CONTENTS (%) AND pH OF BOILER ASH

N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	CaO	MgO	pH
0.14	2.78	21.1	3.85	1.26	12.82



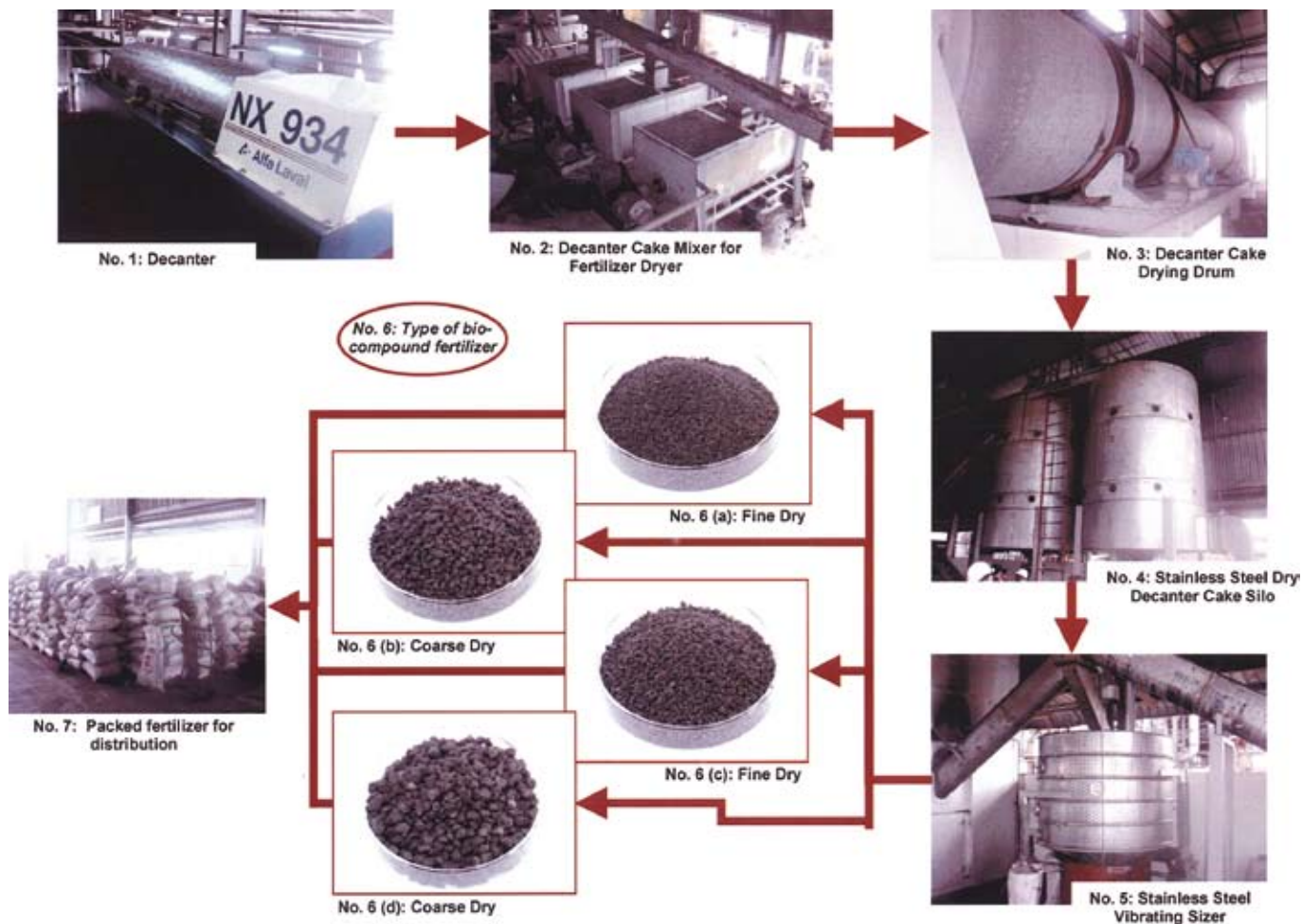


Figure 1. Process system for palm-based bio-fertilizer production.

TABLE 3. CHEMICAL COMPOSITION (%) AND pH OF AN MPOB BIO-COMPOUND FERTILIZER

N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	CaO	MgO	SO <sub>2</sub>	C	pH
6.0	6.0	11.0	13.5	3.5	7.5	28	7.0

TABLE 4. LEAF NUTRIENTS CONCENTRATION (%) OF OIL PALM SEEDLINGS OF DIFFERENT FERTILIZER TREATMENTS

Treatment	N	P	K	Ca	Mg
Control	1.78	0.149	1.59	0.62	0.40
Inorganic fertilizer	3.09	0.172	1.86	0.34	0.31
PBF	2.80	0.178	2.02	0.52	0.30

Table 5 and Figure 2 show that growth of the oil palm seedlings with bio-compound fertilizer was significantly better than that from the seedlings receiving the standard fertilizer and control. This study suggests that slow release of organic material in the bio-compound fertilizer and its high organic C content will increase nutrient uptake efficiency.

### Benefits

- DC and BA from palm oil mill for bio-compound fertilizer are turned into high value-added product; and
- Cheaper palm-based bio-compound fertilizer due to less amount of inorganic nutrient

**TABLE 5. VEGETATIVE GROWTH OF OIL PALM SEEDLINGS OF DIFFERENT FERTILIZER TREATMENTS\***

Treatment	Fronde length (cm)	Leaf area of frond 3 (m <sup>2</sup> )	Fronde dry wt. (kg)
Control	28.85	0.06	0.25
Inorganic fertilizer	53.42	0.18	0.28
PBF	62.03	0.25	0.30
LSD (P=0.05)	4.45	0.04	0.01

Note: \* Mean of 40 seedlings per treatment.

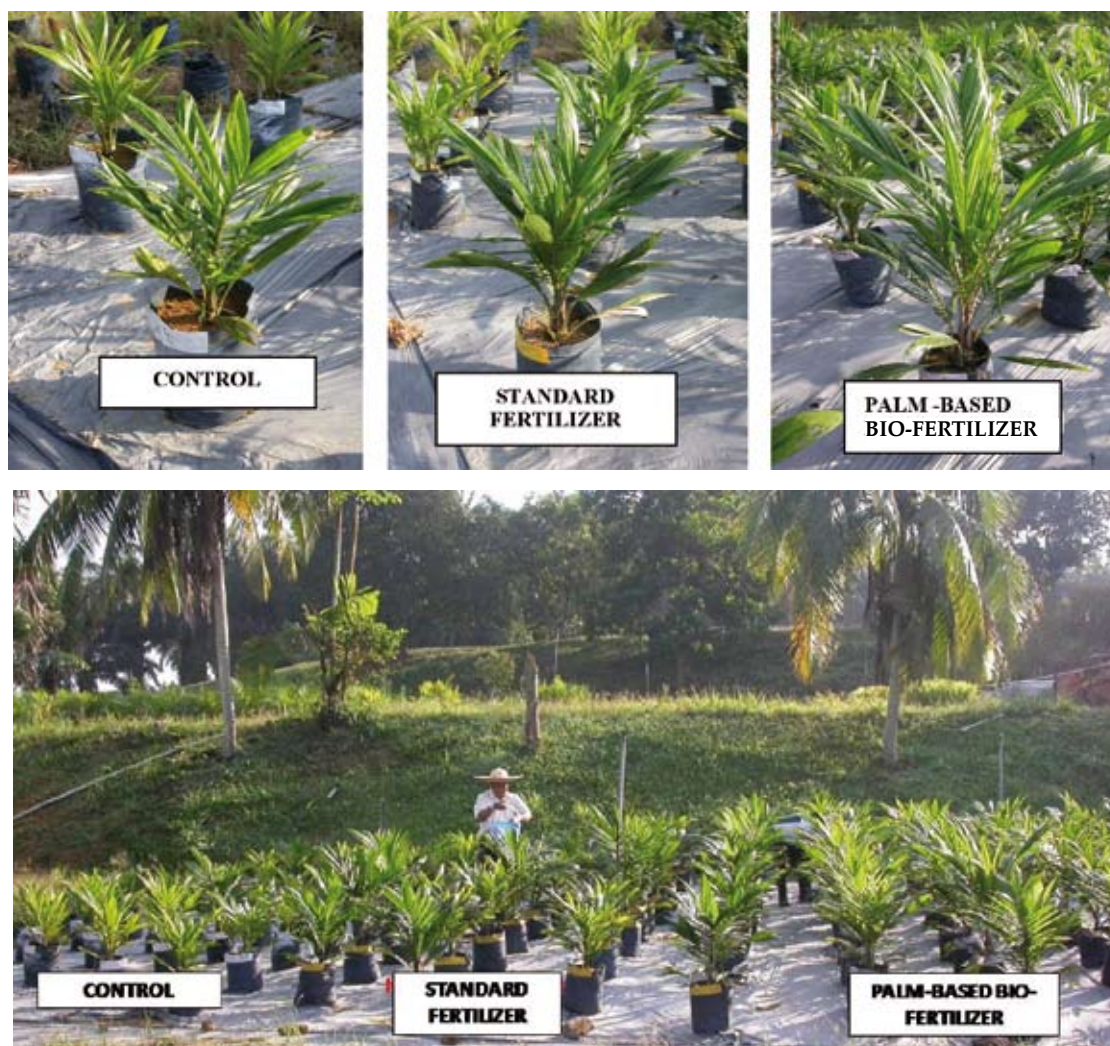


Figure 2. Nursery trial on bio-fertilizer at MPOB Research Station Kluang.

component but as effective as other fertilizers available in the market.

### **CONCLUSION**

Integrating organic and inorganic nutrients as fertilizer can increase the efficiency of nutrient uptake by the crops and enhance the retention of nutrients in the soil in the long-term to improve soil quality.

### **ACKNOWLEDGEMENT**

Research and development for the production of palm-based bio-compound fertilizer was conducted with the co-operation of Synn Palm Oil Mill, Taiping and Hur Far Engineering Works Sdn Bhd, Teluk Intan, Perak.

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