

With the current labour shortage, to reduce the rounds of fertilizer application, subsoil placement (burying) has attracted much interest, especially in remote areas and on undulating terrain. This is mainly due to the belief that burying the fertilizer is as effective as broadcasting it with reduced run-off losses.

Foster and Goh (1975) recommended that fertilizers be broadcasted to maximize their contact with the feeding roots. In Sabah, Soon and Hoong (2002) found that burying fertilizer offered no advantage over broadcasting even for immature to young palms. In fact, Broeshart (1959) found that burying fertilizer at 10 cm depth reduced uptake considerably. In view of the different responses obtained and continued interest of the industry in subsoil placement of fertilizers, a study was conducted by MPOB to compare various compound and straight fertilizers in two methods of applications on immature oil palm on an inland soil.

FIELD EVALUATION

A field trial was conducted by MPOB over six years to compare subsoil placement of fertilizers with the conventional broadcasting method. The experiment was conducted on palms (DxP) planted on hilly terraces (>20°) from cleared jungle at MPOB Research Station, Hulu Paka, Terengganu. A randomized complete block design (RCBD) with four replications was laid out on Bungor series soil (clayey, kaolinitic, isohyperthermic, Typic Paleudult). Five sources of fertilizers were tested: i) granular compound 12:12:17:2 + B (GCS), ii) compact compound 10:5.4:16.2:2.7:0.5B (CCS), iii) control-release fertilizer 16:8:9:3 (CRS₁), iv) control-release fertilizer 21:7:8:2 (CRS₂), and v) straight fertilizers (SFS).

METHODS OF FERTILIZER PLACEMENT

With the exception of the control plots, all the fertilizers were buried, in three pockets (10-15 cm deep) about 1.5 m from the palm. In the control plots, the fertilizers were broadcast within the weeded circle (GCB). The palm performance was evaluated by their vegetative growth, FFB yield, and leaf nutrient content.

OIL PALM PERFORMANCE AS AFFECTED BY FERTILIZER PLACEMENT

The palms at 60 months after planting (MAP) showed better growth with the compound fertilizers broadcast (GCB) than all the fertilizers buried (*Figure 1*). The vegetative parameters, such as frond length, frond dry weight, frond production and leaf area, were significantly higher in the GCB treatment. The subsoil placement of straight fertilizers generally performed the worst in vegetative growth.

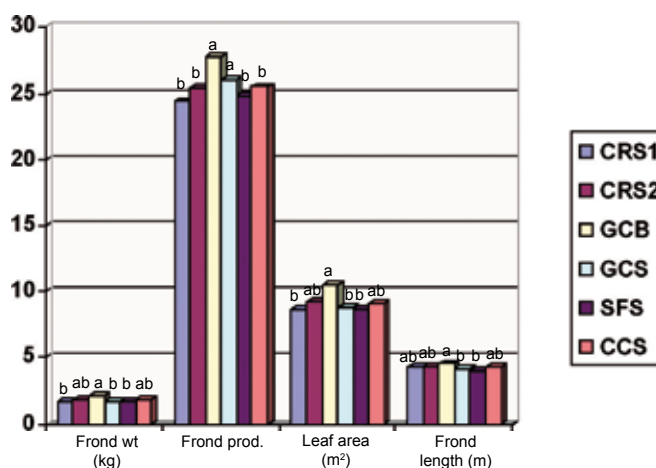


Figure 1. Vegetative measurements of palms at 60 MAP.

The FFB yield in the first three years of oil palm production showed that the granular compound fertilizer broadcast was significantly higher (20.5 t ha⁻¹ in the fifth year after planting) than the other fertilizers by sub-soil placement (Figure 2).

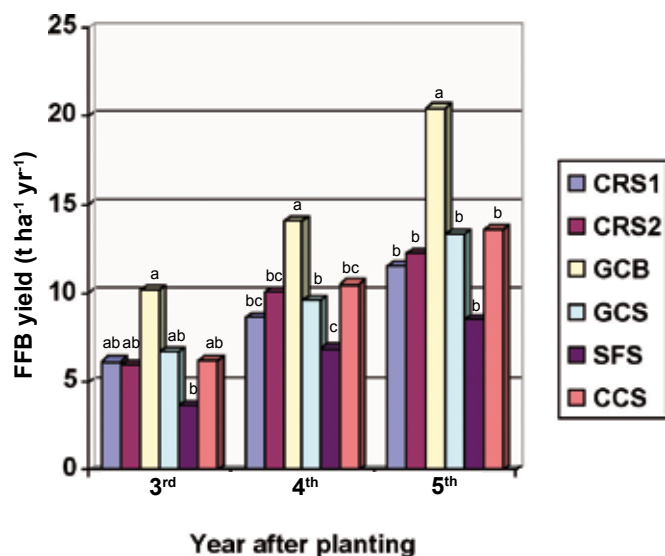


Figure 2. FFB yield in the first three years of production.

The superior performance of the GCB treatment was also reflected in the number of bunches and average bunch weight (Table 1). No significant differences in FFB yield were observed between the fertilizers applied by subsoil placement. In the fifth year after planting, the straight fertilizers gave the lowest FFB yield (8.5 t ha⁻¹) while the compacted compound (13.6 t ha⁻¹) and control-release fertilizers (11.5 and 12.3 t ha⁻¹) performed equally well.

TABLE 1. BUNCH COMPONENTS AND LEAF NUTRIENT CONTENT OF PALMS AT 60 MAP

Treatment	Bunch No.	Bunch wt (kg)	Leaf nutrients		
			N	P	K
			%		
CRS1	13.0bc	6.4b	2.40b	0.13bc	0.95ab
CRS2	13.1bc	6.8ab	2.45b	0.13bc	1.02a
GCB	18.4a	8.3a	2.63a	0.15a	0.91b
GCS	15.4ab	6.3b	2.47b	0.14a	0.97ab
SFS	11.0c	5.6b	2.40b	0.12c	1.01a
CCS	13.8bc	7.2ab	2.46b	0.14b	0.90b

Note: Means within columns followed by the same letter are not significantly different at P<0.05 based on DMRT.

Leaf analysis showed that N and P were significantly higher in the GCB treatment where the granular compound fertilizer was broadcast (Table 1).

The inferior performance of the sub-soil placement method of fertilizer placement was attributed to the limited number of roots to fertilizer contact as compared to the overall broadcast method of fertilizer placement, thus, resulting in a lower efficiency in nutrient uptake.

CONCLUSION

Based from the results of this field trial, it can thus be concluded that application of compound fertilizer by overall broadcast method is the most effective for immature oil palm planted on hilly terraced soil. Sub-soil placement method of fertilizer application, especially using straight fertilizers resulted in inferior performance on palm growth, FFB yield, and leaf nutrient levels.

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