

# MOTORIZED CHISEL (*Ckat*<sup>TM</sup>) FOR SHORT PALM HARVESTING

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**H**arvesting is a very important activity in oil palm cultivation. Efficient harvesting ensures that high quality fresh fruit bunches (FFB) are sent to the mill quickly for processing to produce high quality oil with low free fatty acids (FFA). Efficient harvesting can be achieved by at least two factors; *i.e.* efficient harvesting tool and sufficient harvesters to cater to harvesting rounds of 10 to 12 days as recommended.

A difficulty in getting skilled harvesters and ways on how to improve harvesting productivity has become a necessity. The current manual harvesting (using a sickle or chisel) can only produce 50 to 60 FFB hr<sup>-1</sup>. Estates are now looking for more efficient harvesting tools which can double the productivity in order to increase individual daily harvesting productivity and finally reducing the number of workers.

MPOB has produced two motorized cutters - *Cantas*<sup>®</sup> and *Cantas*<sup>®</sup> - to harvest palms <5 m and 5 - 8 m tall, respectively. *Cantas*<sup>®</sup>, introduced in 2006, has been well received by the industry, doubling the income of the operator. *Cantas*<sup>®</sup> was introduced in 2007 for taller palms and the feedback from its initial use has been positive. However, *Cantas*<sup>®</sup> and *Cantas*<sup>®</sup> are only for harvesting palms at least 2 m tall, and there remains a void for shorter palms. Therefore, a cutter has been developed to fill the void - the *Ckat*<sup>TM</sup>.

## DESIGN CONCEPT

*Ckat*<sup>TM</sup> uses the same head and engine as *Cantas*<sup>®</sup>, but with a chisel instead of sickle for cutting.

## PROTOTYPE

*Ckat*<sup>TM</sup> (Figure 1) comprises a cutting head, pole and 2-stroke petrol engine of 25.4 cc (1.3 hp). It is 1.5 m long and weighs 5.0 kg.



Figure 1. *Ckat*<sup>TM</sup> in operation.

## FIELD TRIAL

The machine is used by a team of two - the cutter solely cutting the FFB with a helper for the other chores like stacking the cut fronds, collecting loose fruits and evacuating the FFB.

*Ckat*<sup>TM</sup> was tested in Tereh Selatan Estate (of the Kulim Group), Kluang, Johor. The average harvesting productivity was about 160 FFB hr<sup>-1</sup> compared to about 110 FFB hr<sup>-1</sup> in manual harvesting using a chisel (Figure 2). Thus, the worker productivity with *Ckat*<sup>TM</sup> was 45% higher. Fuel consumption was 0.2 litre hr<sup>-1</sup>. Taking the average weight of FFB as 5 kg, the daily productivity using *Ckat*<sup>TM</sup> is 6.4 t, or 3.2 t per man-day. The harvesting productivity, however, depends very much on the cropping level as well as the topography.

*Ckat*<sup>TM</sup> has been proven very effective, fast and increases the harvesting productivity, enabling the workers to earn more. The production cost can be lowered by the substantial labour reduction.

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## Worker Productivity - Manual vs. Ckat™

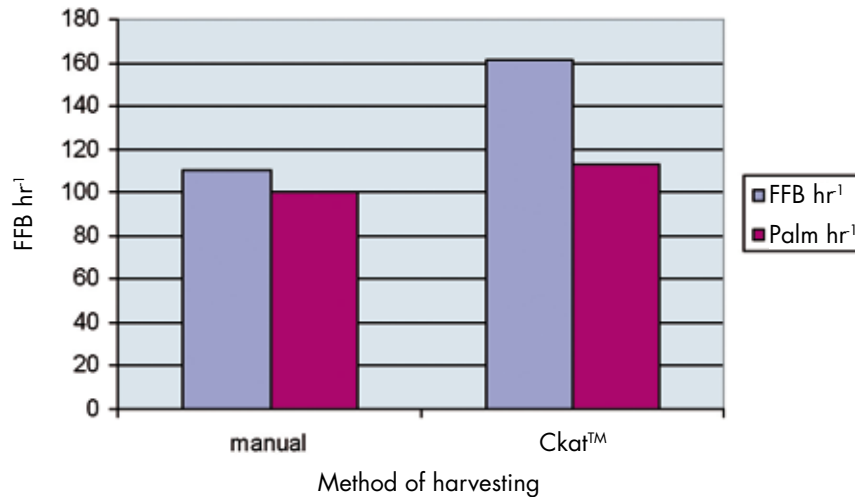


Figure 2. Performance of manual vs. Ckat™ harvesting using chisel.

### ECONOMIC ANALYSIS

- Machine price M = RM 4000
- Economic life E = 2 years
- Productivity P = 6.4 t day<sup>-1</sup> (2 workers)
- Labour cost Lc = RM 50 man-day<sup>-1</sup> (average)
- 23 working days a month

To determine the cost of harvesting:

Depreciation :	$\frac{M}{E \times 12 \text{ months} \times 23 \text{ days}}$	
	$\frac{\text{RM } 4000}{2 \times 12 \times 23}$	= RM 7.25 day <sup>-1</sup>
Fuel consumption 0.2 litre hr <sup>-1</sup>		
@ (RM 1.92 litre <sup>-1</sup> )		= RM 3.07 day <sup>-1</sup>
Repair and maintenance (R&M) @ 0.1% day <sup>-1</sup> used		= RM 4.00 day <sup>-1</sup>
Grease @ 10% R&M		= RM 0.40 day <sup>-1</sup>
Labour cost (2 workers – cutter + collector)		= RM 100 day <sup>-1</sup>
Total		= RM 114.72 day <sup>-1</sup>
Cost per tonne		= RM 114.72 day <sup>-1</sup>
	$\frac{\text{RM } 114.72 \text{ day}^{-1}}{6.4 \text{ t day}^{-1}}$	= RM 17.92 t <sup>-1</sup>

### CONCLUSION

With the introduction of Ckat™, palms of all heights, except the very tallest, can now be mechanically harvested: Ckat™ for palms ≤ 2 m tall, Cantas® for 2 – 5 m, Cantas® for 5 – 8 m and, finally, the Mechanical harvester for 8 - 11 m.

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