

HIGH REACH OIL PALM MOTORIZED CUTTER (*Cantas7*)

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Machinery and labour are the two major inputs in agriculture. Machines can be developed to help labour improve its productivity. There are two factors in maximizing profit, *viz.*, increasing productivity and reducing cost. One way is to mechanize to improve productivity by reducing the labour required which can result in substantial cost saving.

One of the important activities in oil palm cultivation is harvesting. It was estimated that the operation requires 60% of the total labour for the crop, which constitutes about 50% of the total production cost. It is well known that the agricultural sector in Malaysia in general, and the palm oil industry in particular, depend very much on foreign labour to function. Data from the Statistics and Labour Departments revealed that as at June 2006, the number of foreign workers in oil palm plantations was nearly 400 000, about 90% of its total labour. This has been difficult for the plantation industry, and various means have been attempted to mechanize harvesting in order to reduce the labour needs.

The Malaysian Palm Oil Board (MPOB) has developed a motorized cutter, the *Cantas*TM. It has been well received by the industry, being able to more than double labour productivity for harvesting. The only drawback for this cutter is that it can only harvest palms of below 4.50 m. Therefore, a longer cutter is necessary for taller palms.

This article describes a new version of the cutter for taller palms of 8 m height.

DESIGN CONCEPT

The new cutter employs is similar to the *Cantas*TM with the same cutting head and engine. A C-sickle is still used together with the specially designed vibrating mechanism for the sickle to cut. The only

difference is that it has a 5.60 m composite pole which is lighter than the aluminium pole (in the *Cantas*).

There were two important considerations in designing the new cutter - weight and stiffness. A good cutter must be light weight and have a stiff pole for easier handling and control, especially when harvesting tall palms of > 6 m. A weight of more than 10 kg weight would be heavy and difficult to lift. Similarly with flexibility of the pole - too flexible would make handling difficult.

PROTOTYPE

The new cutter, *Cantas7* (Figure 1), comprises a cutting head, a composite pole and a two-stroke petrol engine of 25.4 cc (1.3 hp). The length, weight and deflection of the cutter are 6.70 m, 9.50 kg and 0.08 m, respectively. The only difference of this model from its predecessor is the composite pole which is much lighter than the aluminium pole used earlier. The weight per metre run of the composite pole is only 0.39 kg m⁻¹ *vs.* to 0.72 kg m⁻¹ for the aluminium which is just half over that of the aluminium pole.

The weight and deflection of this model seem acceptable as it is practical to use.

FIELD TRIAL

The machine comes with its own system for optimizing its performance and productivity. In harvesting, a team of at least two workers is formed to cut down and evacuate the FFB. It is fully recommended that the cutter operator only harvests and the carrier does the rest, such as arranging and stacking the fronds, collecting and transport the FFB, and collect the loose fruits.

Cantas7 has been tested in MPOB/UKM Research Station, Bangi and EPA Pasir Logok Estate, Mersing. The average productivity was 40-50 bunches hr⁻¹, or about 8 t a group, or about 4 t

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Figure 1. Cantas7 in operation.

man-day⁻¹. Fuel consumption was at 0.2 litre hr⁻¹. The productivity achieved was very much dependent on the availability of crop and land terrain. However, the terrain does not limit its use as it can be used in all areas - undulating, hilly and peat.

From the trials, *Cantas7* proved to be very effective and fast, and increased harvesting productivity.

ECONOMIC ANALYSIS

- Machine price: M = RM 5000
- Economic life: E = 2 years
- Productivity: P = 8 t day⁻¹
- Labour cost: Lc = RM 50 man day⁻¹ (average)

- 23 working days a month

To determine the cost of harvesting;

$$\text{Depreciation: } \frac{M}{E \times 12 \text{ months} \times 23 \text{ days}}$$

$$\frac{\text{RM } 5000}{2 \times 12 \times 23} = \text{RM } 9.05 \text{ day}^{-1}$$

Fuel consumption

0.2 litre hr⁻¹

$$\text{@ (RM1.92 litre}^{-1}\text{)} = \text{RM } 3.07 \text{ day}^{-1}$$

$$\text{Repair and maintenance (R\&M) cost @ 0.1\%} = \text{RM } 5 \text{ day}^{-1}$$

$$\text{Grease @ 10\% of R\&M} = \text{RM } 0.50 \text{ day}^{-1}$$

$$\text{Labour cost (2 workers - 1 cutter operator + 1 collector)} = \text{RM } 100 \text{ day}^{-1}$$

$$\text{Total} = \text{RM } 117.62 \text{ day}^{-1}$$

$$\text{Cost per tonne} = \frac{\text{RM } 117.62 \text{ day}^{-1}}{8 \text{ t day}^{-1}}$$

$$= \text{RM } 14.70 \text{ t}^{-1}$$

(Note: taking the average productivity per machine of 8 t day⁻¹)

CONCLUSION

Cantas7 has opened up a new perspective in mechanizing harvesting. Palms 5 to 8 m tall can now be mechanically harvested. The worker can benefit with higher productivity and income. The estates will also benefit from lower cost, labour requirement, and other fringe benefits.

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