# POWERED WHEELBARROW: AN IMPLEMENT TO ASSIST OIL PALM FIELD ACTIVITIES

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The labour shortage is affecting all sectors of the oil palm industry. Mechanizing the field activities has, to a certain extent, overcome the problem. Machines are used not only to replace human labour but also to increase productivity and the area covered. The machines are expensive and the average smallholder cannot afford them. The tasks of transporting the fresh fruit bunches (FFB) to roadside collection points, fertilizer application and herbicide spraying have all been mechanized and substantially reduced the number of workers in the oil palm plantation. In addition to these machines, MPOB has developed a small mechanical carrier - the powered (or motorized) wheelbarrow - having a carrying capacity of 300 kg. It is intended for smallholders who cannot afford to own big and expensive machines. This machine does not displace workers but helps to ease their field work, hence allowing them to work longer and increase their productivity. As the machine is small, working on terraces is not a problem.

## THE IMPLEMENT

The powered or motorized wheelbarrow, as the name implies, is a big wheelbarrow with three wheels, powered by a small engine. The basic structure (*Figure 1*) is a mild steel hollow box of 200 mm by 100 mm with a metal bin attached. Three tyres of 4.00 x 8 are used, giving it the ideal height for easy loading of FFB. The front wheel is driven by a hydraulic motor via a V-belt. A hydraulic pump coupled to an internal combustion engine powers this hydraulic motor. Brakes are not necessary as a hydraulic system is used.

This machine is intended to improve the conventional wheelbarrow to a self-propelled vehicle (*Figure 2*). The operator needs only to steer the self-propelled vehicle. The speed is controlled by a two-way valve. The operator walks along the machine, as its maximum speed is only 3 km $hr^{-1}$. The bin that carries the FFB is manually tipped for unloading (*Figure 3*).

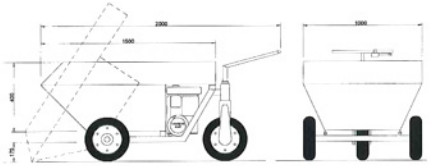

*Figure 1. Schematic drawing.*

Besides carrying FFB, the machine can be used to carry other things such as herbicide and fertilizer application. Thus, heavy manual work is made lighter. The machine manoeuvres very well on flat ground.


*Figure 2. Side view of the powered wheelbarrow.*


*Figure 3. Tipping bucket.*

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It was designed to satisfy the following criteria:

- Affordable price;
- Very low maintenance cost;
- Increased productivity;
- Easy to operate/handle;
- Can be used for transporting general goods; and
- Able to climb a 30° gradient with full load.

## FIELD TRIALS

Field trials were carried out on a smallholding which was flat to slightly undulating. The first prototype was designed and tested at Ladang Koperasi Sg. Ambat, Mersing, Johor. This machine was tested for FFB in-field transport. The area in which the machine was tested was flat to rolling and slightly undulating. With this powered wheelbarrow, the operator need not lift the implement to move from one location to another in collecting FFB (*Figure 4*). When the bucket is full, the fruits are sent to the roadside (*Figure 5*) and unload the FFB by tipping the bucket.

*Figure 4. Collecting FFB in the field.*

*Figure 5. Transporting FFB to the roadside collection point.*

Four to five tonnes of FFB can be evacuated per man-day (average bunch weight of 22 kg). This is three-fold more than the conventional wheelbarrow (*Table 1*). The general specifications are given in *Table 2*.

## THE BENEFITS

The production cost of the motorized wheelbarrow (less than 50 units) is RM 4000 to RM 5500. This can be reduced if produced in quantity.

**TABLE 1. COMPARISON OF PRODUCTIVITY BETWEEN CONVENTIONAL AND MOTORIZED WHEELBARROWS**

| Means of evacuation | Productivity (t day$^{-1}$) |
|---|---|
| Conventional wheelbarrow | 0.93 - 1.4 ( avrg. 1.16) |
| Motorized wheelbarrow | 4 - 5 (avrg. 4.5) |

**TABLE 2. GENERAL SPECIFICATIONS OF THE MOTORIZED WHEELBARROW**

| Item | |
|---|---|
| Bucket length | 1 500 mm |
| Bucket width | 1 000 mm |
| Bucket height | 400 mm |
| Bucket unloading | Manual tipping |
| Engine (gasoline) | 4 hp |
| No. of hydraulic motor | One of 351 m$^{-1}$ |

As the wheelbarrow is self-propelled, minimal manual power is required to transport the FFB. Older operators can operate this machine since it does not require much effort. The carrying capacity is larger, hence allowing more FFB to be transported per trip. This saves time and increases productivity.

Such an implement is desirable for small operators, as increasingly older people are involved in such work. The powered wheelbarrow can also be used for fertilizer application. Fertilizer can be placed in the trailer and manually broadcast by the operator. This eliminates manual carrying. This powered wheelbarrow can also be used for weed control. The toughest task is to transport water, which can be carried in the bucket in a large volume, minimizing the frequency of replenishment.

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