

OIL PALM MECHANICAL CUTTER

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The mechanical cutter is attached to an infield transporter that carries the harvested FFB. This cutter is suitable for cutting and pruning.

DESIGN CONCEPT

Several criteria have been considered in the design of this mechanical cutter. The cutter should be easy to handle, efficient and should improve productivity. It is designed to reduce the worker's strain during the cutting operation. The unit can be hand-held or mounted onto a boom. It can be attached to any prime movers that have a hydraulic power source.

PROTOTYPE

Feature

Claw cutting concept is used where it has two blades of equal size moving in opposite directions that can be opened and closed. The device is attached to a two-metre length aluminium pole and is activated by a double-acting hydraulic cylinder. The hydraulic power is supplied through a 12-metre length twin hose from a prime mover. An electrical switch placed on the pole is used to activate the solenoid valve which opens and closes the cutter. It was designed in such way that it can cut a frond and FFB in a single operation. The mechanical cutter is fabricated fully using local parts.

Difficulty in getting skilled workers for handling manual cutting tools, and unavailability of an effective mechanical cutter have been a common issue that needs a solution. The current method involves the use of a chisel or sickle, this requires manual labour and is tedious. This paper describes a newly innovated mechanical cutter which solves the above issues.

Cutting oil palm fruit bunches (FFB) is an activity that requires special skill and a lot of energy. The worker who does the job should have a good skill to handle the tool plus enough energy to carry out the cutting job. Harvesting of short palms (<3m height) and tall palms (>3m height) requires different tools and techniques. A chisel attached to a short steel pole and a sickle fixed to a long aluminium pole are the tools normally used for short and tall palms, respectively.

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Operation

In the harvesting operation, the operator drives the prime mover and stops at one point in the middle of the harvesting path when he sees a ripe bunch. The long hose (12-metre in length) is adequate for the operator to cover three palms around the stop point for carrying out the cutting operation before moving to another stop point. A solenoid control valve is used for activating the cutting blade in the cutting operation.

FIELD TRIAL

Location

Field trials were carried out in commercial plantations to compare the productivity of this cutter against manual collection under similar palm height (< 3m height), field topography and harvesting round. Manual harvesting was done by using chisel attached to a short steel pole. Both manual and mechanical trials were done concurrently.

Trial Procedures

In these field trials, the cutter was attached to an infield transporter (one tonne bin capacity, single chases). The machine was operated by a worker who cut FFB, stacked the fronds, loaded the FFB onto the bin and carried the FFB to the roadside. On the other hand, for the manual harvesting using

chisel, two workers did the job in which one worker did the cutting and frond stacking while the other collected the FFB using a wheelbarrow.

Results

The trials revealed that the machine was capable of evacuating an average of 2.2 tonne/man-day compared to that of manual harvesting that could cut and collect FFB at an average of 1.1 tonne/man-day. Using this machine, the harvester could work much longer hours as much energy was saved in the cutting operation, hence improving their productivity. Comparing to the manual harvesting using chisel, the use of this machine is equivalent to two manual workers producing the same productivity.

CONCLUSION

This mechanical cutter makes the harvesting operation more attractive and efficient. The workers can save their energy in the cutting operation, thus could prolong their working hours. Back strain of the workers can be reduced. The productivity of the machine can be maximized if the harvesting path is properly prepared for better machine accessibility.

Trials have been done on palms below three metres in height. Future work will be to examine the productivity of the machine for taller palms. This cutter can also be used for frond pruning as well.

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