Key Words: Arecanut stripping from bunch

Introduction:

The operation of lifting and beating each arecanut bunch on a solid surface several times and collection of stripped arecanut from ground level is usually performed which leads to high demands of energy expenditure and develops high work stress in the majority of the arecanut plantation workers. These results in musculoskeletal disorders, such as upper limb disorders, lower limb disorders and less job satisfaction. For minimizing the human effort and also to increase the productivity, a rotary type, worker friendly arecanut stripper with safety features was developed. The hold-on type arecanut stripper unit consisted of a feed tray, a rotary stripping mechanism. The arecanuts were separated from bunches due to the impact force of the rotating blades, the stripped arecanuts fell on the feed tray. The entire unit was mounted on steel structure. The stripper was suitable for stripping both green and ripe arecanuts. The developed worker friendly arecanut stripper was evaluated for its performance and its suitability for male and female workers was assessed for reduced human comfort. The damage caused to the stripped arecanut was eliminated. The use of the worker friendly arecanut stripper enhanced the comfort of the subjects with reduction in physiological stress and body part discomfort when compared to conventional arecanut stripping.
Objectives:

- The main purpose is to separate arecanut from its bunch.
- Reduce the human intervention.
- Reduce the time consumption.
- Helpful for economic purpose.

Methodology:

Steel Frame structure required to support the rotary stripping mechanism was fabricated. Angular cross section of size 3.81 x 3.81 x 0.635 mm of 18 feet long was used. According to the drawing dimensions, raw material was cut. These cut pieces were welded to each other to form a frame. On the breadth side of the frame two holes were drilled to fix the rotor assembly to the frame with the help of two pedestal bearings. Rotor shaft which holds the blade to beat the bunch of arecanut was made of hollow pipe having cross section of 75 mm diameter and length 1000 mm. On either side circular plates were welded to fix the solid shaft for power transmission. Solid shaft was introduced into the hollow pipe and on either side bearings were fitted along with plumer block for bearing housing bolted to fabricated steel frame. In order to beat the arecanut from the bunch without damaging, the profile of the blade is designed. The blades are made from MS flat cut to the required size and heated in furnace finally forged to get the required profile so that proper bunch separator occurs during working. Forged Blade is drilled to a hole diameter of 12mm in order to fix it with cups using bolt and nut. On the outer areciphery of the hollow pipe the rotavator blade cups are welded with a distance of 75mm from each blade, which is aligned in right angles to each other in all four directions. 60 numbers of cups were welded on the hollow pipe which has got provision to bolt the blades to the root of it, this method is adopted in order to replace the blades whenever it gets damaged or loses its function of beating the bunch. The design of casing is done according the dimensions 1219 x 1143 mm sheet metal of 16 gauge of 2 numbers which are cut to required size of 457.2 x 457.2 mm of 2 numbers.1219 x 1066.8 mm of 1 numbers and 1066.8 x 838.2 mm of 1 number. In cut piece of 457.2 x 457.2 mm sheet is taken for casing upper portion of the rotor in order to prevent escaping of arecanut while its bunch is fed to the rotor, with one cut piece of 1066 x 838.2 mm sheet. Below the rotor assembly a tray is provided in order to collect the arecanut which are separated by its bunches it is in a trapezoidal form. Additional to it a tray is placed below the rotor assembly in order to collect the arecanut separated from its bunch and this tray is placed in inclined manner and welded to table. A power take-off (PTO) is a splined driveshaft, usually on a tractor or truck that can be used to provide power to an attachment or separate machine. The power take-off allows implements to draw energy from the tractor's engine. In order to rotate the rotor assembly, the Power Take - Off shaft is coupled to the tractor through which the power transmission takes place which in turn rotates the rotor connected
with the help of pulley and belt. The speed of the rotor can be controlled by accelerator-pedal of the tractor. Tractor is used for power transmission instead of electric motor in order to overcome the power cut off problems, which are most common in rural areas. In addition to this a provision can be made to fix the electric motor for power transmission for those farmers who are not having tractors. In arecanut bunch beating technique, feeding of bunch to the equipment is very important.

Feeding can be done in two ways:
1. Manual feeding
2. Using hopper

In the present study Hopper method is adopted. According to it, the arecanut bunches from the arecanut is detached and it is fed to rotor assembly to separate arecanut from its bunch. The feeding is through manually then a person need to hold the bunches in his hand and slowly feed it to the blades of rotor, which is rotating in turn hits the arecanut and the separation takes place. One operating manually one can feed the 2-3 bunches. The separated arecanut are collected outside the equipment using tray.

**Conclusions:**

The Arecanut Bunch Beater is developed and tested successfully. This machine is compact in design, making it portable. This machine is economical compared to the other existing machines. It can be operated by semiskilled personnel also. Hence this machine has overcome the problems associated with the existing machines. After performing the experiments it can be concluded that the machine has an efficiency of 75%.

**Scope for future work:**

- Wheels can be provided for easy transportation inside the areca plantation.
- Instead of PTO shaft electric motor can be connected.
- Feeding of arecanut bunch can be made automatic.