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Removing the Bunch of Areca Nut from the Plant and Spraying of Pesticide by using Remote Operated Device

Arunkumar S M[1], Sharath Kumara K E[2], Kevin Thomas Job[3], Dharshan R[4], A Gangadhar[5]

[1]*(Assistant Professor, Dept. of Mechanical Engineering, Bangalore Technological Institute, India)*
[2]*(Mechanical Engineering, Bangalore Technological Institute, India)*
[3]*(Mechanical Engineering, Bangalore Technological Institute, India)*
[4]*(Mechanical Engineering, Bangalore Technological Institute, India)*
[5]*(Mechanical Engineering, Bangalore Technological Institute, India)*

Abstract: The main aim of this project is to design and fabrication of areca nut tree climbing and spraying machine. The device consists of an L-shape base frame which supports all the components to be built upon. It is fitted with petrol engine, nylon tyres with rubber grippers at parallel each other for ease of the operations. A specially designed remote controlled spraying unit is mounted on the frame. Power from the petrol engine is supplied to the wheel climbing an areca nut tree as well as spraying unit. Tapered wheel which is attached to the gas spring gives self-locking to the machine and it will help in balancing the machine while climbing tree. To accommodate for a change in the diameter of areca nut tree as the device moves up and down, enough clearance is maintained between two parallel wheels. The device has been tested for its performance and to make it safe, reliable, efficient and also reduces the problems in climbing and spraying areca nut tree to a good extend.

Keywords: Areca nut, Harvesting, Pesticide spraying and Tree climbing.

I. INTRODUCTION

Areca nut plantation is major cash crop cultivation in India. Areca nut is extensively used in commercial processes as it has large medicinal applications. Apart from its vast uses, the harvesting methods used are still ancient and highly in-efficient. Even finding skilled labors has become tough as they should be capable of climbing high altitudes of the areca nut trees. Harsh weather conditions make the tree climbing process very difficult. Irregularities and defects in tree structures may also create difficulties in climbing.

The people in India mainly depend on agriculture for their livelihood. The main crops grown in the South part of India that is in the Kerala and Karnataka are Areca nut and coconut. For spraying and applying insecticides on the crown and also for harvesting, skilled labourers have to climb manually up the tree. Such a process looks easy, in reality it is a laborious and dangerous task. Areca nut trees attain a height of about 60-70 feet. It is mandatory to climb the trees a minimum of five times a year for a successful harvest - twice for the preventive spray against fungal disease, and thrice to harvest the areca nut.

There is a need to invent a device to address efficiency safety and cost effective. The design of the device has to be simple enough for villagers to operate, yet work efficiently to appeal to the majority. In present days the climbing methods that are been used by the farmer are Rope climbing method and Rectangle wooden seat climbing method. Rope climber is economical and simple in design which consists of rope of length one meter twisted to the shape of the sandal, the user wears this sandal and climb the tree manually. In rectangle wooden seat climber the user hangs the wooden seat on his back and climbs the tree manually, once he reaches the tree top he ties the wooden seat to the tree and rest on the seat to harvest the arecanut. Although this two methods are simple and economical. It is not safe and cause physical strain to the user.

II. LITERATURE SURVEY

JananeshBekal et al. [1], The basic principle of friction with a X frame and two rollers at the bottom. The conical shaped rollers provide wedge action between the tree surfaces to maintain a strong contact. It also consists of a movable arm which can rotate at a 360 degree angle and is used for spraying pesticides. The system is connected to a Battery whose wires are passed all the way down the tree to the ground. The machine is controlled based on human judgment and also the system is only restricted up to the spraying of pesticides hence these drawbacks limit the use of this machine at a certain height up to a visible range.

Arjun Prasad et al. [2], has designed a harvester which uses friction to hold on to the palm tree with the help of springs. The machine is made adaptive such that it can adjust to the variable trunk dimensions of the tree. Adaptively is made possible with the help of compression springs along the periphery of the machine. A

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video camera is used to give the input so as to where the fruit is located. This camera is coupled with a Zig-bee microcontroller and X-bee RF module to control the machine wirelessly.

Fasil TK et al. [3], have fabricated a machine working on the basic principle of rope pulley system. The shaft of the motor is welded to the drum which winds the steel rope around the tree. During the drum winding the spring gets contracted and the spring force acts opposite to the direction of the applied force. This opposite force generates an upward motion. The climbing down mechanism is by a rope which is tied on to lower and upper rings. When the rope is pulled from the ground the mechanism comes down in a step wise manner with the help of the rings.

Sharana Basavaraja et al. [4], tree climber is mainly focused on two units RH and LH. The RH unit create the downward movement of the pedal, through which steel wire rope is stretched and locks the areca nut tree. Now the LH unit is lifted up by pulling the handle attached to it to climb and the same process is repeated to reach the required height. To descend the tree the pedal of RH unit is pushed down and the handle of the LH unit is also pulled down alternatively till the bottom of the tree.

Abhishek Chakraborty and Shivam Sharma [5], A two stroke engine is one which completes its cycle of operation in one revolution of the crankshaft or in two strokes of the piston. In many two stroke engines the mechanical construction is greatly simplified by using the piston as a slide valve in conjunction with intake and exhaust ports cut on the side of the cylinder. A carburetor is that part of a gasoline engine which provides assimilation air-fuel mixture as and when required. The author have used single cylinder two stroke experimental way. A driver controls the engine speed by increasing or reducing the amount of fuel with the help of accelerator pedal. The experimental results show that which size of main jet gives better result under various load and gear operating condition.

III. OBJETIVES AND METHODOLOGY

3.1 Objectives

The main objective of this proposed work are as follows:

- To design and develop portable areca nut harvesting and pesticide spraying machine.
- To design the RF transmitter and receiver circuit to control the machine.
- To install properly designed sprayers or cutting device many number of trees can be harvested in a single climb thus increasing the efficiency
- To design a simple, safe and reliable machine. So that an unskilled former or labour can also operate the machine safely and efficiently
- To remove bunches of areca nut with help of slicer arm.

3.2 Methodology

- At first mild steel frame is made with given dimension, after that bearings are fixed to the frame. Wheels and shafts are attached to the frame with the help of bearings. After transmission system is assembled in the frame two stroke petrol engine is assembled to the transmission system.
- Supporting wheel which is attached to the air springs are attached to the frame by welding process. Slicer arm is fixed to the frame with the help of bolts and nuts. And spraying arm is fabricated by mild steel rods by welding process.
- Wireless remote consist transmitter and receiver, transmitter has two joystick module and one push button to control and operate machine
- Receiver is fixed in the frame and servo motor is connected to the engine accelerator cable to control the engine acceleration.

IV. WORKING PRINCIPLE

The areca tree climbing and spraying machine works on the basic principle of friction that is the relative lateral motion of two solid surfaces in contact. The machine developed consists of a base frame with two nylon wheels of diameter 150 mm and distance between two wheels is 300 mm. wheels are arranged in such a way that to give enough locking between machine and areca tree. Wheels are connected to the main frame through bearings which are driven by high torque geared diesel engine. The frame consists of a slot to fix the slicer arm and sprayer arm. The remote is designed to operate the harvesting machine. By using this remote operator can control the machine by pressing the buttons on the remote.

The above Fig.1 shows the working mechanism of the project, all the main parts are being supported by the frame and machine is operated with wireless remote controller. The machine is fixed to an areca tree. Depending on the work either slicer arm or sprayer arm is going to fix to the frame. When operator press the

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start button on the remote engine is going to start, and when he press the forward button the machine will start to climb an areca tree. After removing an areca bunch by operating the remote machine can be bring down.

4.1 Components

The project work required better frame for better support and stability. The frame material was initially collected and fabricated depending on the size required. The overall fabrication of the project model was done starting from frame to end project. The various steps involved in the fabrication of the project are measurement, marking, cutting, welding, grinding, cleaning, painting, testing and implementation. The Fig. 2 shows 2.4 Ghz Transmitter and Receiver. The components used in design and fabrication of electromagnetic embossing machine are as follows;

- Shaft
- Bearing
- Petrol engine
- Chain Sprocket
- Wheels
- Slicer arm
- RF transmitter and receiver module
- Battery
- Joy stick module
- Push Button
- Servo motor

V. FIGURES

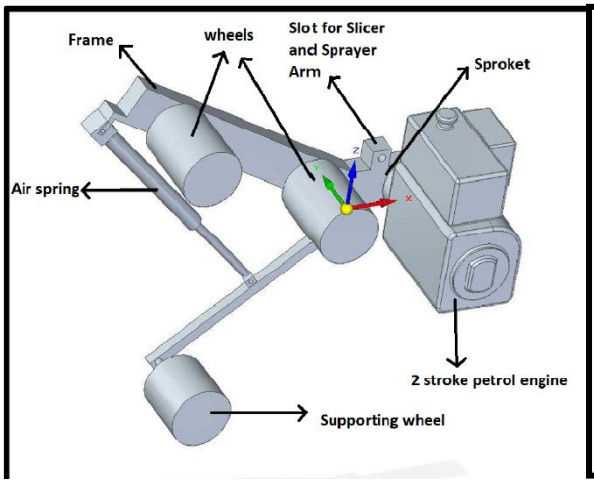

Fig: 1 3D CAED Model

Fig: 2 2.4 Ghz Transmitter and Receiver

VI. CONCLUSION

Our main aim is to represent our innovative concept, we have taken some useful data from our conceptual model. The observations which were made are:

- At the present condition, the machine can be used to cut the areca nut from the areca nut tree.
- And the machine can also be used for spraying operation. For this purpose, a special attachment will replace the cutter.

To overcome problems in conventional machines such as low efficiency, difficult to operate, the proposed model of remote controlled areca nut plucking machine is helpful and complete all the expectations needed in plucking the areca nut.

Based on the project done and the further discussions, the conclusions are:

- The machine will overcome the limitations of existing machines by introducing the simplest mechanism.
- Compact and simple in geometry.
- Cost effective in small, medium and large industries.

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- Works on minimizing effort on the tree which in turn will not damage the tree.
- The safety and health of humans can be ensured by this machine, since the entire operation is controlled from the ground via Remote control.

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