

# Survey on Areca Nut Reaping Drone and Technology Development in Agricultural Sector

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**Abstract**— The main objective of this paper is to do a literature survey on advancements in technology in the agricultural sector and the need to develop better models for areca nut reaping.

Areca nut is known by its biological name called Areca Catechu. It is medium sized tree of a height of 20-meter-tall with a trunk diameter of 10cm to 15cm. The tree bark is narrow and grows up vertically. The farmers face a lot of problems while harvesting the nuts. The cost of harvesting the crop becomes higher and higher as they use manual labor for harvesting whereas the cost of each nut is very less.

Some advancements have been taken place in this area and when survey was carried out through the research papers, it was understood that the old methods have been replaced by new techniques that involve technology.

We see few of the technology models used to reap the areca nuts and how they have been developed.

In case of a man, he has to always get down the tree after plucking the areca nuts and go to the next tree to pluck the next set of areca nuts.

Whereas in case of new technology, the machines go up the tree and reap the areca nuts. We shall discuss the existing systems in this paper and also talk about what advancements can be done and proposing a new system of Areca Nut Reaping Drone.

**Keywords** — Drone, Areca nuts, reaping, propeller, clamp, cutter, controller.

## I. INTRODUCTION

India is a developing economy. Growth of a country is all dependent on the agriculture sector. Every nation's primary objective is to become self-reliant.

Key issue faced by farmers is to monitor large farms. All the problems include irrigation, spraying pesticides and herbicides and reaping the crops at the right time. Using the old methods, they are very time consuming, tedious and tiring.

Until now, manual labor was the only solutions to all this problem just increased time to complete a particular job.

For example, in areca nut farming, the fields need to be maintained. The reaping should be done time to time and the trees need to be taken care of.



Fig 1. Areca Nut Farm, Tree and Areca Nuts.

Areca nut is known by its biological name called Areca Catechu. It is a medium sized tree of a height of 20-meter-tall with a trunk diameter of 10cm to 15cm. The tree bark is narrow and grows up vertically. The farmers face a lot of problems while harvesting the nuts. The cost of harvesting the crop becomes higher and higher as they use manual labor for harvesting whereas the cost of each nut is very less.

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## II. LITERATURE SURVEY

[1] *Areca Nut Farming in Southern Indian. A Case Study (September, 2014)- S. Aaron Hegde and John Deal.*

Areca nut is known by its biological name called Areca Catechu. It is a medium sized tree of a height of 20-meter-tall with a trunk diameter of 10cm to 15cm. The tree bark is narrow and grows up vertically. The farmers face a lot of problems while harvesting the nuts. The cost of harvesting the crop becomes higher and higher as they use manual labor for harvesting whereas the cost of each nut is very less.



Fig 2. Areca nut farming.

The labor cost for single tree is 25 rupees and the cost of the bunch of nut from one tree is 8 rupees. The cost ratio is not feasible for the farmers. At the same time the time taken to harvest the areca nuts through labor work takes a long time and is very tiring. When this time taken and the price required to harvest the areca nuts by old methods can be used for other useful stuffs like to monitor other farms and take care of them.

[2] *Farmer's Bike: This Farmer's Bike Climbs the Trees in 30 Seconds with the Labourer. A Case Study (May, 2021)- Himanshu Nitnaware.*

It has two tires and a roller that are linked together to grab the areca nut tree trunk. Below the operator's chair, lies a fuel tank. By pulling the lever, the speed of the motor bike is controlled. There are hydraulic breaks that are for the safety of the operator who is riding it.



Fig 3. Farmer's Bike.

The areca nut bike helps the farmers to climb the tree without any effort and very easily can reap the areca nuts on the particular tree. A single person takes about five to eight minutes to climb the tree and reap the areca nuts. The task that would take days to reap the areca nuts from the tree, now can be done easily with less effort and within a few days itself. The cost ratio works out with the farmers if they have huge fields of areca nuts to be reaped.

[3] *Design and Fabrication of Areca Nut Tree Climbing, Plucking and Spraying Machine (January, 2021)- Sanjay B. S.*

It has two tires, a roller that are linked together to grab the areca nut tree trunk, a fuel tank and blade to cut the stems of the areca nuts.

The climber is clamped to one of the trees. The climber goes up the tree with full force. This force helps in cutting the areca nuts. The tip of the climber has a blade that will be pointing towards the stem of the areca nuts. The force exerted by the climber cuts off the stems of the areca nuts and they fall on the ground. When the areca nuts are not to be reaped, the climber used to spray pesticides on the areca nuts. This is a very easy task for the farmers as they don't have to climb the tree to spray the pesticides. The climber sprays the pesticides to all the areca nuts present on that tree.



Fig 4. Areca Nut Tree Climber.

The climber is clamped to one of the trees. The climber goes up the tree with full force. This force helps in cutting the areca nuts. The tip of the climber has a blade that will be pointing towards the stem of the areca nuts. The force exerted by the climber cuts off the stems of the areca nuts and they fall on the ground.

**[4] Design and Fabrication of Areca Nut Tree Climber and Harvesting Machine. (February, 2019.)- Shivedeep. D. R.**

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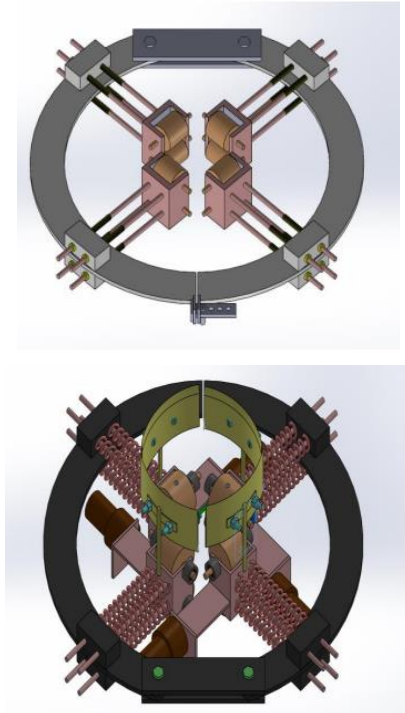


Fig 5. Design of Areca Nut Tree Climber.

The climber is clamped to one of the trees. The climber goes up the tree with full force. This force helps in cutting the areca nuts. The tip of the climber has a blade that will be pointing towards the stem of the areca nuts. The force exerted by the climber cuts off the stems of the areca nuts and they fall on the ground.

Only a prototype was made to check if this method is feasible or not.



Fig 6. Prototype of the Areca Nut Tree Climber.

**[5] Semi- Automatic Areca Nut Tree Climbing and Harvesting Robot (May, 2017). – Eldhose Paul, Lovin Varghese, Ajo Issac John, George Jolly and Akash Paul Savio.**

The previous tree climbers were always operated by a man. It was again a tedious work as a person should always be present to operate the climbers.

To solve this problem, another machine was invented that is automated. The climber is just attached to the tree and the climber goes up automatically. The sensors and the camera present in this climber will detect and see where is the stem of the tree.

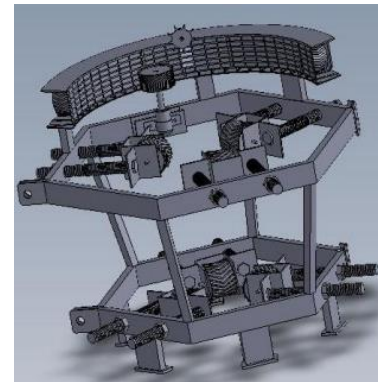


Fig 7. Design of Semi-Automatic Tree Climber.

Accordingly, the climbers cut the stems of the areca nuts. The stem of the areca nuts is cut automatically. The areca nuts that are cut fall on the ground.

The climber after cutting comes down and the person removes the climber de-attaches the climber from the tree and then the climber is attached to another tree so that the same process can be repeated. This process is continued until all the trees in the field is completed.

**[6] Smart Areca Nut Plucking Robot (June, 2019)- Swetha T. N, Uma N, Harini T. M, Kusuma R, and Hashikumar G. H.**

Areca nut tree climbing and reaping machine works on the fundamental standard of erosion that is the relative horizontal movement of two strong surfaces in a contact. The machine created comprises of a base edge with 4 nylon wheels driven by 4 high torque equipped engine. It is a rectangular shaped machine. A spring is utilized to give good amount of space to grab the tree trunk of the areca nut. The energy is derived from the engines present.

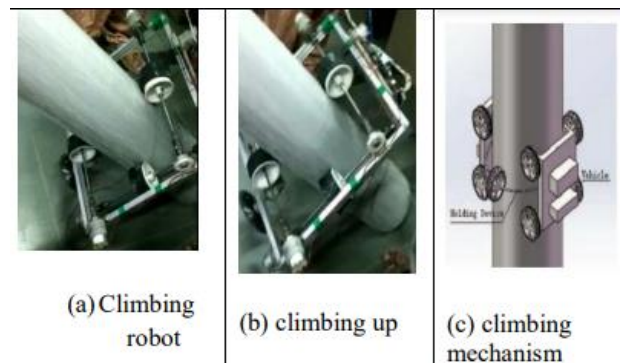


Fig 8. Mechanism.

The energy is utilized to control the machine. It also has wheel, the part that is attached to the tree has wheels on them so that the friction between the tree and the machine reduces. The pressure on the string helps the machines hold the tree tightly. As it is clamped to one of the trees, the machine goes up cuts the areca nuts and comes down., Next the machines I clamped to another tree and the process is repeated to cut all the areca nuts present in the field.

**[7] Development of Areca Nut climbing and Harvesting Machine with Pesticides (February, 2021)- C. Sathishkumar, G. Dineshkumar, K. S. Karthikeyan and P. Prasanna.**

This model has a human rope and a pulley type mechanism is used. The rotary motion of the machine or mechanism is used to pull the areca nut stems. The spring is fitted in a longitudinal manner.

The spring fitted along the longitudinal axis of the machine helps in reforming the original structure this allowing the tool to move upwards as the lower end is free moving and the upper end is grabbing the tree.

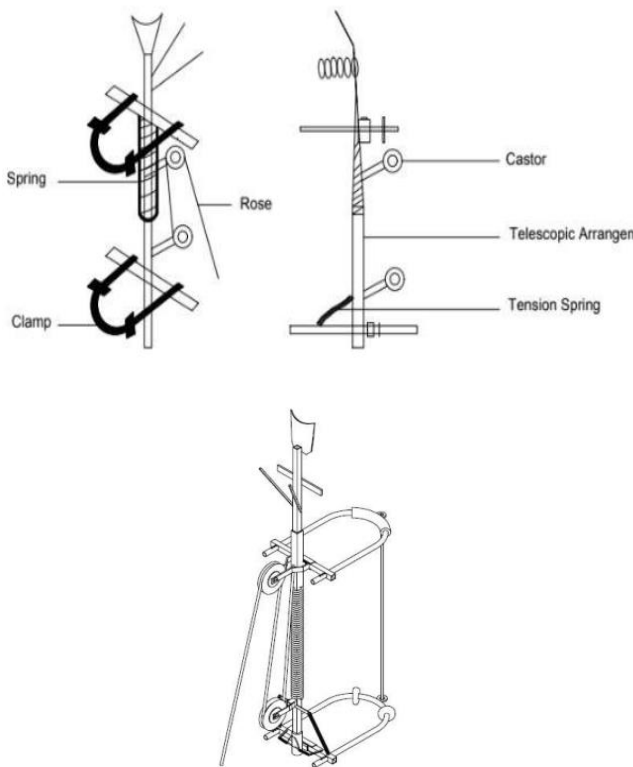


Fig 9. Design of Areca Nut Tree Climber.

The tool or machine climbs up to the top of the tree and is ready to cut down the stem of the areca nuts. What actually happens is the machine climbs up the tree. The machine goes up with force and the pulley mechanism attaches the pulley mechanism with the rope to the areca nuts bunch. Once this is done, the person present below has the hold of the other end of the rope. With the help of this rope, the man pulls down the bunch of the areca nuts. The areca nuts are cut down and collect after they are reaped.



Fig 10. Working Model.

This is basically used as for small scale farmer. This is feasible for the small scale farmers because the ratio cost for reaping the areca nuts and the selling costs is very feasible and reliable for the small scale farmers.

**[8] Modern Agricultural Drones. The Development of Smart Farmers (July, 2018)- Yuwalee Unpaprom, Nathhawud Dussadeeb and Rameshprabhu Ramaraj.**

Drones are used in a wide range of tasks like logistics tasks, patrol areas, infrastructure maintenance, maps generation using cameras and sensors. Many platforms use this drone technology to make life easier.

The same technology is used in maintaining the crops in huge fields. The drone is designed in a way that the drone is installed with a camera that will monitor the crops in the field or a pesticide sprayer that will spray the pesticides on the crops present in the field.



Fig 11 Drone for Spraying Pesticides.



Fig 12. Drone for Observation of Crops.

The drone is a proper normal usual drone. The drone is controlled by a controller. The drone takes off in the air, the drone is controlled by the controller. As the drone reaches the crops in the field, either it just monitors the crops present in the field or the command to spray the pesticides on the crops present in the field is given via the controller. These pesticides help the crops grow better and maintain the health of the crops in the field.

The drone can help the farmers in saving time and money for them as the drone helps them to easily spray the pesticides or to monitor the crops present in the field. The crops are maintained for long. This drone is mostly a onetime investment and only changing the battery and maintaining it properly can help increase the harvest of crops better and also reduce the cost of maintaining the fields for the farmers.

This is a very developing technology. As technology is getting better more and more functions are fabricated on the drone.

**[9] Agricultural Drone (April, 2021)- Manvendra Kushvaha, Siddhart Jha and Dr Yogesh Kumar.**

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**[10] Drone Assisted Areca Nut Harvesting Module (July, 2020)- Rakesh B. K, Vineet L. Kulkarni, Ruthvik S, Vasistha, Monisha P and Madan K. R.**

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Fig 14. Drone in Areca Nut Field

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Fig 15. Drone Used in Areca Nut Field.

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**[11] Automated Flower Picking Robot (July, 2021)- Pathmavasan Radhakrishnan.**

Flower Harvesting BOT is a new innovative idea which is developed in concern with Farm Labor, in order to reduce the work and time consumption of laborers.

Usually there are thorns present in the plants that have flowers to be plucked. When a laborer comes to pluck the flowers, the thorns can hurt them and sometimes getting hurt again and again is dangerous. At times there might be insects present in the plants as the flowers attract insects because of its sweet smell. So again when the laborer comes to pluck the flowers, the insects present in the plants can harm them and give them a very hurtful or dangerous bite.

To overcome all this, a new technology is used to pluck the flowers from the plant. The robot has a clamp like structure that has small blades. The camera present on the robot detects the flower and accordingly to the commands, the clamp present is stretched out and it holds the flower and plucks the flower and drops it in the basket present.

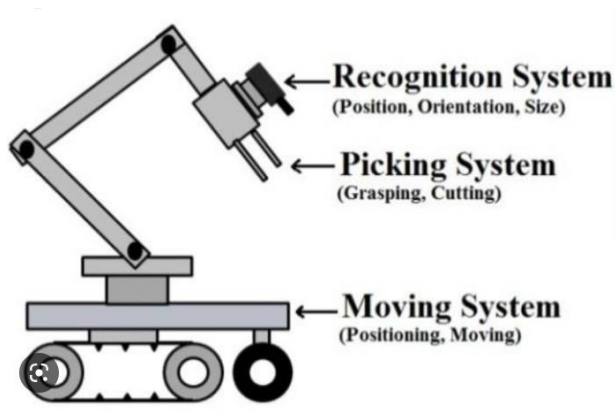


Fig 16. Flower Plucking Machine.

This robot is manually operated. The controller is used to send commands to pluck the flower from the plants and again a command is sent drop them in the basket.

**[12] Semiautomated Device for Plucking of Flower (December, 2019)- L. Megalan Leo and A. Jerrin Simla.**

Main objective of the work is to pluck the flower buds using robot. The device is designed as a Raspberry Pi201 controlled robot with camera to capture the image, image processing technique to match the image, robotic arm to pluck the flower bud and a container to collect the bud.

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Fig 17. Automatic Flower Plucking Machine.

To overcome all this, a new technology is used to pluck the flowers from the plant. The robot has a clamp like structure that has small blades. The camera present on the robot detects the flower and accordingly, the clamp present is automatically stretched out and it holds the flower and plucks the flower and automatically drops it in the basket present.

This robot is manually operated at first. The robot is sent into the fields where the flowers are present in the plant. And then automatically the robot does its tasks and gives the farmer the plucked flowers from the plants.

### III CONCLUSION

Over all we realize that the technology is increasing day to day in very sector. We see here that the agricultural sector also isn't playing in the back foot and is developing its methods and making tasks more efficient.

The old methods to complete tasks in agricultural sector are very time consuming, very expensive, very tiring and the cost ratio goes in negative to the farmers. In any kind of farming there are new technology. Especially in the areca nuts agriculture sector there can be advancements as they take a lot of time to harvest and to maintain and the cost ratio is always negative for farmers. To overcome most of the short comings in the areca nut harvesting and reaping can be solved by all the methods mentioned in the above proposed projects and survey papers. These methods help the farmers in turning their investment into profit. Especially for the large scale farmers these mechanisms are very helpful. They reduce the cost ratio and also increase the profits and also reduce the time consumed to harvest or reap the areca nuts in the huge areca nuts fields. By the survey carried out, these methods can be developed more and more and make the life of the farmers easier. The existing system also has a few drawbacks. Few of the drawbacks are, the machines have to always to attached and detached or the petrol used can increase the harvest price for the farmers. To overcome these drawbacks, we can propose another system to reap the areca nuts. We observe that the growth in technology in the agricultural area has given a drift in profits for the farmers. There cost margin ratio goes positive in the earning that goes into the pocket of the farmers. It shows that the technology is developing in every area and no area is left out without technology be involved. We realize that the people want to make life easier and that's why technology development is helpful for people in every other way possible.

The proposed system is, reaping the areca nuts with the help of a drone. The drone requires nothing but battery and a remote controller to control the speed and the movement of the drone. Advancements in this area can be carried out as it will be a onetime investment and the farmers can get a profit out of the harvest of the areca nuts.

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