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Robotized Arecanut tree climber and pesticides sprayer

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ABSTRACT

Areca nut is one of the foremost commercial crops of India. Sourcing skilled labors for agricultural sector has become a time. This paper describes about the robot which would eliminate the need of manually climbing the Areca nut tree in order to spray pesticides. The robot consists of square frame which is fitted with four wheels. The up and down movement of robot is performed by dc motor with gears. This robot carry tank with it and two spraying unit are used which provide 180degree rotation to the arm by dc motor. The power supply is provided by batteries and signal from user is transmitted using RF transmitter and receiver .Then totally robot was controlled using remote. This designed robot reduces the dependence of labour and spray pesticides with good level of accuracy.

Keywords: Areca nut, RF Transmission, Receiver, Dc Motor, Sprayer.

INTRODUCTION

The areca nut is the fruit of the areca palm, which grows in much of the tropical Pacific and Southeast and South Asia. Areca nut is a palm species long standing plant has multiple uses. Each part of the areca nut plant is used for making crafts products. Areca nut medicinal properties were effective against skin diseases, cough, digestive disorders etc. In India there are two varieties of areca nut, also called supari in Hindi language. One is the white variety and the other is the red variety. The white areca nut is produced by harvesting the fully ripe nuts and then subjecting it to sun drying for about 2 months. In the red variety the green areca nut is harvested, boiled and then its exterior husk is removed. The chemical

composition of areca nut comprises 14 to 15 percent of fat, polyphenols, tannins, alkaloids, polysaccharides, a small amount of protein, and vitamin B6 and vitamin C. The fat, which is extracted by using organic solvents, is made up of mastic acid and its byproducts. The fat is mixed in a certain proportion with cocoa butter or coconut oil, which is then used to make confectioneries and duplicate dairy products. The polyphenol (tannins) content varies from 38 to 47% in tender nuts and 15 to 22% in ripe nuts. Tannin, which is extracted from the nut, is used in foods as natural coloring agent. Areca nut husk is used to make many industrial products such as hardboard, insulation wool and cushions.

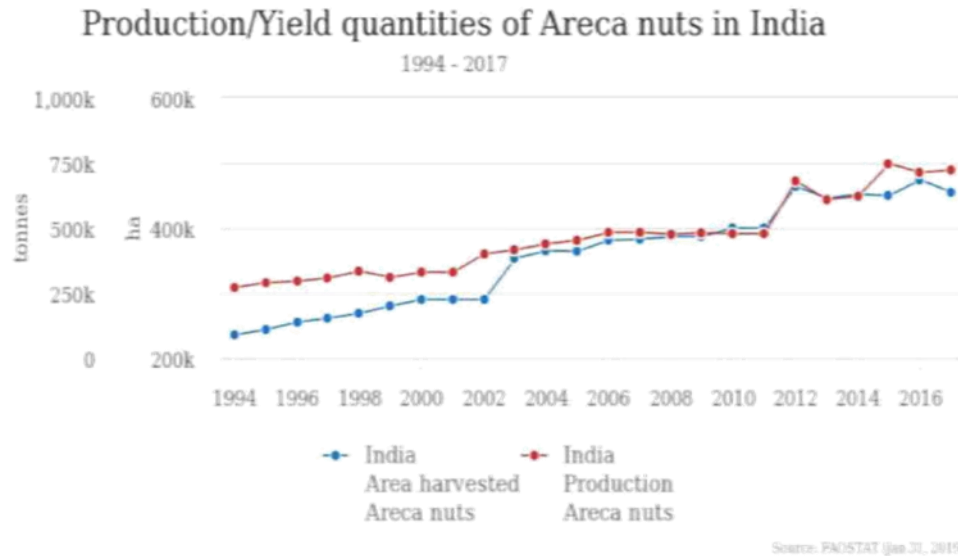


Fig 1: Graphical representation of India harvested Areca nuts and its production from 1994 to 2017.

Areca leaf sheaths are used to make ply-boards. Other important uses of leaf sheath are to make caps, eating bowls, vessels to keep palm wine, and artifacts. Areca palm is affected to number of diseases like Koleroga/mahali/fruit rot, Yellow leaf disease, Anabe or foot rot during its growth due to this its productivity reduces so we spray pesticides to reduce the diseases.

LITERATURE REVIEW

Tree climber is mainly focused on two units RH and LH. The RH unit create the downward movement of the pedal, through which the steel wire rope is stretched and locks the areca 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 [1].

On the account the safety, reliability, the ease of use which is capable of climbing trees, cutting down coconuts, cleaning the tree tops and spraying pesticides. He designed a system that can be controlled by anyone. The designed proto type responds to human gestures with negligible gap in the response time and hence can be implemented in real time [2].

Tree climbing Robot consists of a four bar linkage and screw mechanism. The mechanical structure is designed to move the structure upwards against the gravitational forces in successive upper body and lower body movements. The result shows that the tree bot can successfully climb the trees with diameter range 15cm to 25cm. [3]

A novel method for climbing and harvesting is proposed. The design of the hardware setup is discussed and the controlling units are designed. The sharpened the materials selected are appropriate for selected are appropriate for the device to function. Stability of the device is achieved through the tree wheels on either side which tightly grips the entire circumference on the tree. All the aspects of this project like design development and verification were done in detail [4].

Machine works on timely gripping and release of the tree by two metal wire ropes locked to the moving frame. By this design the structure is absorb a load of 100 kg. It is flexible to change the height of the equipment up to 100mm according to the equipment of the user. It has easy maintenance. This structure will be beneficial to middle class.

DISEASES AND CONTROL MEASURES

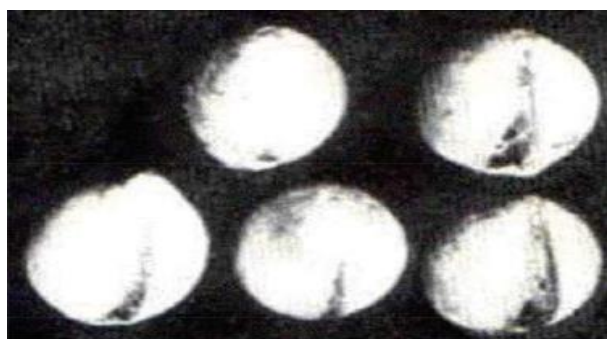
Nut-splitting

Nut-splitting is more a physiological disorder than a pathological problem of universal occurrence. It is seen in well-grown, young and healthy palms. The growth of the pericarp does not keep pace with the development of kernel inside, causing splitting up of the pericarp. The split nuts drop and infection of the exposed kernel, renders

them useless. The splitting is due to excess flow of cell sap into the inflorescence in the very healthy palms. Hence, checking of excess flow either by making some deep wound at the base of the spadix or jamming the cells at the base when the nuts are half grown prevents splitting. Sudden flush of water after a period of drought also results in nut splitting.

Control Measures

Application of potassium borax (2 g/litre of water) during early stages of the disease reduces splitting.



Nut splitting

Yellow leaf disease

Yellowing of leaves begin in the inner whorl, gradually spreading to the outer parts of the crown. Chlorosis is finally observed on almost all leaves in the whorl from the edges of the individual leaflets to the midrib region. Withering of the tips starts and gradually spreads to the older portions of the leaf. The freshly formed leaves grow shorter and their laminae show unequal growth and flaccidity. The nuts are reduced in size, shriveled with their kernels often turning black and there is severe reduction in yield. Stem of the affected palms becomes spongy and friable, the conducting strands getting destroyed. In advanced stages, the stem breaks off at the top. Rotting of the roots is

also observed. Association of mycoplasma-like organisms (Phytoplasma) with the disease has been confirmed. Lack of balance nutrition and unscientific cultivation practices make the palm susceptible to the disease.

Control Measures

Physical condition of the soil should be improved by deep digging and adding sand/organic matter. In heavy sticky soils, gypsum @ 500 kg / ha may not be incorporated, once in two years prior to normal fertilizer application. Sun-scorching of the stem should be avoided by covering with areca nut leaves or painting with lime slurr



Root grub (*Leucopholis lepidophora*)

The grubs attack and feed on roots of both young and old palms. Due to root feeding, the leaves turn pale-yellow and yield is reduced. Keeping the garden clean, well-drained and free of weeds reduces its attack. Loosen the soil around the base of the palm to a depth of 10-15 cm and drench with chlorpyrifos (0.04%) suspension twice, in May and September.

Control Measures

Repeat the application for 2 or 3 years for complete eradication of the pest. Soil application of Phorate 10 g around the palms is also effective

Bud rot

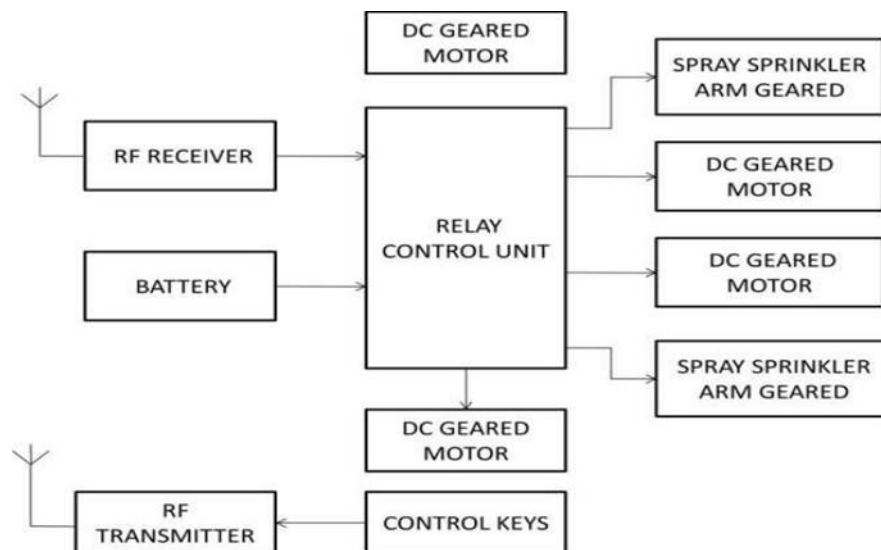
Bud rot is a fatal disease of areca palms caused by *Phytophthora palmivora* and characterized by rotting of terminal bud and surrounding tissues and ultimately killing the palm.

Control Measures

In early stages of infection, scoop out affected rotten tissues by making longitudinal side splits. Apply Bordeaux paste and drench the crown with Bordeaux mixture (1 %).



BLOCK DIAGRAM



EXPLANATION

The battery used is 12v, 7Ah gives supply to relay control unit and motors. It consists of switches to control the machine by user. A 433MHz transmitter sends signals through the antenna to Receiver. It receives the signals from the transmitter circuit. Control unit consists of electromagnetic relays which are used to control

the motor for climbing the trees and also the arm motor attached to the nozzle for sprinkling. Movable arm is attached with the nozzle sprinkle pesticide to the arecanut. The motor used is 12v, 10rpm DC motor with gears which is attached to the wheels and used to climb the tree. The sprinkler sprinkles the pesticide in fine droplets at the arecanut branches and arecanut.

Description of equipment

S. No	Name	Quantity
1	DC motor	8
2	Wheels	8
3	Batteries	4
4	Tanks	2
5	Pump spray	2
6	Relay	1
7	Remote Control	1
8	Springs	4

RESULT AND DISCUSSION

The goal of the agricultural artificial intelligence is additional than simply the appliance of robotics technologies to agriculture. The smart pesticide sprayer for arecanut is designed and tested for various arecanut trees. The unit is capable of climbing tree for about 30 feet. The unit is also tested for wet condition and is able to climb the arecanut tree without slips for about 20 feet.

Advantages

- Reduces man power.
- Avoids the risk of tree climbing.
- User friendly.

Naturally, it avoids the risk of tree climbing and many scopes for up this project extra along with cutting arm for harvest the ripe arecanut, Replacing the current sprayer arm by the another arm which can spray pesticides for more than one arecanut trees. With these implementations, the device will come back out as an excellent server for the arecanut farmers.

- Easy technique to spray pesticides.
- No damages to Areca nut trees.

Limitations

- Currently it can spray only for one tree at a time.

SCOPE FOR FUTURE WORK

The robotized Arecanut tree hiker and Pesticides Sprayer will be undoubtedly a gift for the farmer at intervals the longer term days. The scarcity of knowledgeable arecanut tree climbers can be simply resolved by this unit.

CONCLUSION

The adopted technology makes the climbing of machine and pesticide spraying wireless. There is lot of work already done in this area but there is no device which is 100% accurate. There are various designs which are giving positive results but contain lot of complexities. The paper proposes smart robot for agriculture that guarantees to overcome positive challenges that consists the present day agriculture. It encourages the use of

technology to spice up the productivity in agriculture. So we conclude that the proposed machine is a safe, reliable, efficient and automatic tree climber which reduces the problems in climbing the arecanut tree and also it solve the problem of spraying pesticides on areca nut and it Branches. The agricultural vehicle for spraying pesticides proposed in this paper might be a

collaboration of all basic attainable technologies, to bring out a new and therefore provides personal safety. There are needy vehicle to assist farmers in tasks involving risks. Projects like this encourage people to take up cultivation of full time and half time jobs. This is essential in developing countries, especially Asian nation, where agriculture is the Backbone of the economy.

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