

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal) Visit: <u>www.ijirset.com</u> Vol. 7, Issue 9, September 2018

Experimental Design of Collection and Separation of Cashew Fruit Machine

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ABSTRACT:Cashew is often regarded as poor man's crop and rich man's food that is an important cash crop and highly valued nut in the global market. The area under Cashew cultivation is the highest in India. However it is not so in the case of productivity, processing and quality. So to increase productivity modern agricultural technology is necessary to use. This paper attempts to partially replace human by semi-automated machine for collection and separation operations. These processes involves collection of Cashews from ground by roller type collector and after collecting it transfer to separator. So that separation of Cashew Apple from Cashew is done so an efforts of collection and separation are reduced. This machine is simple to operate for single person by electrical power.

KEYWORDS: Machine design, Collector, Separator, Semi-automatic machine.

I. INTRODUCTION

The Cashew nut tree is first grower and ever green tropical tree. It grows to height of 12 m blossoming takes place between November and January. The fruit ripens with two months.

The nut is attached to the lower portion of cashew apple which is conically shaped. The nut (seed) hangs at the bottom of the apple. And is C shaped. The cashew seed has within the shell the edible kernel or nut. Cashews outside shell is tough enough to protect inside nut. It is hard to break by hand and the apple attached to it is juicy and soft.

In actual process of cashew is collected and separated from its apple. This process of collection and separation is done now days manually. It requires lot of manpower for collection of cashews and separation from apple by twisting it. Cultivation area of cashew tree is minimum of 2m to 3m so it's difficult for single or two persons to collect it and it's time consuming. It's possible to done this collection and separation process with small cultivation area by manually but it's also time consuming. As cultivation area increase manpower required for this process is more and sometimes farmers do not have that much manpower to done this process. So finally it can be conclude that this process of collection-separation is time consuming and requires more efforts.

To solve this agricultural problem there is need of technical solution. This paper introduce about the machine that will do this process with very less effort and within less time. This machine is simple to use and single person can operate.



ISSN(Online): 2319-8753 ISSN (Print): 2347-6710

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II. LITERATURE REVIEW

The literature survey is carried out in order to seek information about the above said subject. However, there is no literature available which illustrates the collecting and separating of Cashew nuts. So, it also concludes that no work has been carried on the above said subject. However, there is a little work carried on the collection of other fruits and vegetables.

Johan Baeten et. al. [1] invented an Apple picking machine in Belgium. The key motive of this machine was to harvest Apples. The machine consisted of the art industrial components with newly designed flexible gripper. The gripper consist of a Silicone funnel with a camera mounted inside.

Pitzer [2] invented the fruit berries picking machine near Duette. The construction as big as a bus, long enough to straddle a dozen rows of strawberries at once. It consisted of a computer mounted at the top which is controlled with software and super accurate GPS. They also used robots to pick more than 50% of ripe berries. However, he concluded that this machine is slower than human hands and needs for further improvement.

K. Ashwini [3] in her paper, designed a movable strawberry harvesting robot which was molded on a travelling platform and they were developed and operated in green house. Combining the harvesting robot and travelling platform. It demonstrated the potential for autonomous harvesting in 2D area in a greenhouse.

Nadine Sangster et al.[4] studied harvesting for particular fruit crops in lower production level, his design a mechanical fruit picking device which could assist in the reaping process. He gave more impetus on picking the fruits without damages in a specified period of time.

Hayashi et al. [5] A strawberry harvesting robot, which performs autonomous harvesting by moving back and forth along a set of rails, was developed and tested in field. Strawberry harvesting robots is cylindrical type and mounted on travelling platform, were developed and operated practically in a greenhouse. The harvesting robot is based on the second prototype; however, it can be separated from travelling unit. Both the robot and the travelling platform are modular system units that can be developed and tuned individually before it installed on the platform. Intercommunication takes place via digital I/O signals.

Andrew Meikle [6] was invented first threshing machine in 1786 by Scottish engineer. A threshing machine or thresher is a piece of farm equipment that threshes grain that is it removes the seeds from the stalks and husks. The subsequent adoption of such machine was one of the earlier examples of the mechanization of agriculture.

Denison [7] was issued a patent on August 12, 1839, for a freestanding, hand –operated machine that removed individual kernels of corn by pulling the cob through a series of metal-toothed cylinders which stripped the kernels off the cob. Soon after, other patents were granted for similar machines, sometimes having improvement over his original design. Corn Sheller can be powered by a hand crank, a tractor, a stationary engine, or by an electric motor. Whole corn cobs are fed in. They are pulled between two toothed wheels, usually made of metal. Each wheel spins the opposite direction of the other. The teeth pull the kernels off the cob until there are no kernels left. The kernel fall out through a screen into a container placed underneath the machine.

Sarig. Y. et al., [8] studied the development of novel technologies for extracting pomegranate seeds, to be utilized as both, fresh and processed products. Proceedings of the 6th international symposium on fruit, nut, and vegetable production engineering, Potsdam, Germany.

Okokon, et al., [9] done the Analysis of the Impact Forces on Melon Seeds during Shelling. Agricultural Engineering International.



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From literature survey, it is found that very few research work done on this topic. Concept of this collection-separation machine is not exist yet. Hence, it is decided to carry out an experimental work to find performance and efficiency of this machine.

III.EXPERIMENTAL WORK

Collection and separation process will be done in separate sections within machine. Collection of cashew from land will made of roller like structure. It will roll over the land and collect cashew. Another process will to separate cashew apple from cashew and it will achieve by cutting cashew apple and separating it from cashew.

Collector will have roller like structure. It collects cashews, and these cashews passing through conveyer towards separator where cashew apple and cashew will separate from each other. Approximate machine structure we have included in this synopsis. In actual process, roller will roll on ground, by which it will collect cashews. After that, the separator which will connected after

In actual process, roller will roll on ground, by which it will collect cashews. After that, the separator which will connected after the conveyer output will done separation process.



DIAGRAMMATIC REPRESENTATION



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IV.CONCLUSION

This paper deals with the solution for time consuming and effort taking process of Cashew Farming. Now day's process of Cashew collection and separation from fruit is manual process. And we know this large amount of Cashews collection and separation from fruit by human hands it is not better option. Also it takes lot of time and effort. So that this paper work inform that there is a best technical solution for this. Machine that is mentioned in this paper will be operate by single person and it will easy to handle. Power require for this machine will be less than human efforts. So we can conclude that this machine is the technical solution to solve this cashew farming problem.

REFERENCES

- 1. DHUMAL, J.D., 1984, Studies to prolong the shelf life of pomegranate fruit (Punica granatum L.). Unpublished M. Sc. Thesis submitted to M.P.K.V., Rahuri (Maharashtra).
- ERIC KOFI GBADAM, SIMONS ANTHONY AND ELIAS KWASI ASIAM., 2009, The Determination of Some Design Parameters for Palm Nut Crackers. European Journal of Scientific Research. 38(2): 315-327.
- 3. KUSHWAHA, H.L., SRIVASTAVA, A.P., AND HARPAL SINGH, 2005, Development and Performance Evaluation of Okra Seed Extractor. Agricultural Engineering International, Vol. VII.
- 4. "Design of machine element", V.B. Bhandari, Tata Mc- Graw Hill Publication, 3rd Edition.
- 5. "Mechanical Design Synthesis with Optimization Applications", Johnson R.C., Von-Nostrand-Reynold Publication.
- 6. "Process Equipment Design", M.V. Joshi, Macmillal Publication, 3rd Edition.
- 7. Ashwini K, IJCSMC, Vol. 5, Issue. 1, January 2016, pg.96-101, survey paper on "Fruit Picking Robots".
- 8. Clemens Fuchs, Joachim Kasten and Matias Urbanek, 2015, Trends and Potential of the market for Combine Harvesters in Germany.
- 9. Johan Baeten, Kevin Donne, Sven Boedrij, Wim Beckers and Eric Claesen, 2007, Autonomous Fruit Picking Machine: A Robotic Apple Harvester.
- 10. Nadine Sangster et al., IJAIEM, Vol-6, Issue 8, August 2017, ISSN 2319-4847, The Design of A Fruit Picking Device.